The New England JOURNAL of MEDICINE

FORMERLY THE BOSTON MEDICAL AND SURGICAL JOURNAL

OFFICIAL ORGAN OF
THE MASSACHUSETTS MEDICAL SOCIETY
THE NEW HAMPSHIRE MEDICAL SOCIETY — THE VERMONT STATE MEDICAL SOCIETY
THE NEW ENGLAND SURGICAL SOCIETY — THE BOSTON SURGICAL SOCIETY, INC.
THE NEW ENGLAND PEDIATRIC SOCIETY AND
THE NEW HAMPSHIRE SURGICAL CLUB

OWNED AND PUBLISHED BY THE MASSACHUSETTS MEDICAL SOCIETY

Volume 199, Number 2
$6 per Annum, 25c per Copy

JULY 12, 1928

Published Weekly in Boston
at 126 Massachusetts Avenue

CONTENTS

Spinal Anesthesia for Upper and Lower Abdominal Operations. *L. F. Sise* 59
Novocaine in the Reduction of Fractures. *Hilbert F. Day* and *Walter S. Levenson* 66
Local Anesthesia in First and Second Stage Labor. *David Rose* 68

BOSTON CITY HOSPITAL

Healing and Healed Vegetative (Subacute Bacterial) Endocarditis. *Soma Weiss* and *Cornelius P. Rhoads* 70
Ketogenic Diet in the Treatment of Epilepsy. *William G. Lennox* 74

The Effect of High Voltage, Short Wave Lengths, Roentgen-ray Exposure on the Circulating White Blood Cells. *Richard P. Stetson* 76
Rotaro-lateral Curvature of the Spine Secondary to Hypertrophy of the Heart. *Harold C. Lee.* 78
The Problem of Sterility. *John Rock* 79
The Familial Incidence of Exophthalmic Goiter. *Hyman Morrison* 85

MEDICAL PROGRESS

Progress in Gynaecology. *Frank A. Pemberton.* 87

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

Case 14211—Cervical Adenitis with Weakness and Pallor. *Richard C. Cabot.* Case 14212—Fatal Albuminuria without Nephritis. *Chester M. Jones* 94

EDITORIALS

Rabies 102
Undulant Fever 102
This Week's Issue 102

(Contents continued on next page)

Rapidly Selling Out of Print

THE NEW MAYO CLINIC VOLUME

The current annual volume from the Mayo Clinic and the Mayo Foundation is rapidly selling out of print. In it are recorded all the advances, all the laboratory findings, the refinements of operative technic as developed at these medical Meccas of America.

The practical character of the contents of this volume may be judged from the fact that it contains articles on gastric and duodenal ulcers, dyspepsia, nervous indigestion, partial gastrectomy, tests for hepatic function in cirrhosis of liver, cholecystography, medical treatment in diseases of liver and bile passages, jaundice, colitis, acute appendicitis in children, anorectal diseases, nephritis, prostatectomy, historectomy, operations during pregnancy, exophthalmic goiter, diabetes, diseases of the blood and blood-forming organs, malaria therapy in paresis, orthopedic work, bronchoscopy, eye work, etc., etc. This new Mayo Clinic Volume is better than the best heretofore published.

Octavo volume of 1330 pages, illustrated. By W. J. Mayo, M.D., Charles H. Mayo, M.D., and their Associates at the Mayo Clinic, Rochester, Minnesota, and the Mayo Foundation, University of Minnesota. **Cloth, $13.00 net.**

W. B. SAUNDERS COMPANY — **Philadelphia and London**

Entered at the Postoffice at Boston as Second Class Matter

CONTENTS

(Continued)

BOOK REVIEWS
Post-mortem Appearances. Joan M. Ross 106
Special Cytology 106

BOSTON MEDICAL LIBRARY
Dr. Nathan Smith. 1762-1829 103

CORRESPONDENCE
A Correction of the Report of the Cape Cod Health Bureau Association. George H. Bigelow 106

MISCELLANY
Rules Adopted by the Trustees of the Union Hospital of Fall River with Respect to Industrial Accident Cases 104
Rules and Regulations of Fair Grounds 69

NOTICE OF MEETING 106

OBITUARY 105

SOCIETY MEETINGS 106

The Massachusetts Medical Society

The next Annual Meeting of the Massachusetts Medical Society will be held in Boston, June 11 and 12, 1929, "unless otherwise ordered by the Council."

OFFICERS ELECTED BY THE COUNCIL, JUNE 5, 1928

PRESIDENT: JOHN M. BIRNIE, 14 Chestnut St., Springfield.
VICE-PRESIDENT: PEER P. JOHNSON, 163 Cabot St., Beverly.
SECRETARY: WALTER L. BURRAGE, 182 Walnut St., Brookline.
TREASURER: ARTHUR K. STONE, Auburn St., Framingham Center.

STANDING COMMITTEES FOR 1928-1929

COMMITTEE OF ARRANGEMENTS
James Hitchcock, E. P. Hayden, H. Q. Gallupe, T. H. Lanman, F. H. Colby.

COMMITTEE ON PUBLICATIONS
Homer Gage, John W. Bartol, R. I. Lee, R. B. Osgood, E. W. Taylor.

COMMITTEE ON MEMBERSHIP AND FINANCE
D. N. Blakely, Algernon Coolidge, Samuel Crowell, Gilman Osgood, Homer Gage.

COMMITTEE ON ETHICS AND DISCIPLINE
David Cheever, W. D. Ruston, S. F. McKeen, Kendall Emerson, A. C. Smith.

COMMITTEE ON MEDICAL EDUCATION AND MEDICAL DIPLOMAS
P. P. Johnson, A. G. Howard, R. L. DeNormandie, H. P. Stevens, C. H. Lawrence.

COMMITTEE ON STATE AND NATIONAL LEGISLATION
J. M. Birnie, A. W. Marsh, T. J. O'Brien, F. E. Jones, Shields Warren.

COMMITTEE ON PUBLIC HEALTH
Dwight O'Hara, E. F. Cody, R. I. Lee, T. F. Kenney, F. G. Curtis.

COMMITTEE ON MALPRACTICE DEFENSE
F. G. Balch, E. D. Gardner, F. B. Sweet, R. P. Watkins, A. W. Allen.

OFFICERS OF THE SECTIONS FOR 1929

SECTION OF MEDICINE
Chairman, Dr. Lester C. Miller, Worcester; *Secretary*, Dr. Roger W. Schofield, Worcester.

SECTION OF SURGERY
Chairman, Dr. Philemon E. Truesdale, Fall River; *Secretary*, Dr. L. S. McKittrick, Boston.

SECTION OF TUBERCULOSIS
Chairman, Dr. John B. Hawes, 2nd, Boston; *Secretary*, Dr. Walter A. Griffin, Sharon.

SECTION OF PEDIATRICS
Chairman, Dr. C. A. Sparrow, Worcester; *Secretary*, Dr. Joseph Garland, Boston.

SECTION OF OBSTETRICS AND GYNECOLOGY
Chairman, Dr. Frederick L. Good, Boston; *Secretary*, Dr. Louis E. Phaneuf, Boston.

SECTION OF RADIOLOGY AND PHYSIOTHERAPY
Chairman, Dr. William D. McFee, Haverhill; *Secretary*, Dr. P. F. Butler, Boston.

OFFICERS OF THE DISTRICT MEDICAL SOCIETIES

ELECTED BY THE DISTRICT MEDICAL SOCIETIES BETWEEN APRIL 15 AND MAY 15, 1928

BARNSTABLE—*President*, S. M. Beale, Jr., Sandwich; *Vice-President*, H. D. Handy, Harwich; *Secretary*, J. L. Chute, Osterville; *Treasurer*, H. B. Hart, Yarmouthport; *Librarian*, E. E. Hawes, Hyannis.

BERKSHIRE—*President*, C. H. Richardson, Pittsfield; *Vice-President*, M. S. Eisner, Pittsfield; *Secretary*, H. J. Downey, Pittsfield; *Treasurer*, C. T. Leslie, Pittsfield.

BRISTOL NORTH—*President*, F. H. Dunbar, Mansfield; *Vice-President*, T. J. Robinson, Taunton; *Secretary*, J. L. Murphy, Taunton; *Treasurer*, J. V. Chatigny, Taunton.

BRISTOL SOUTH—*President*, J. G. Hathaway, New Bedford; *Vice-President*, G. L. Richards, Fall River; *Secretary and Treasurer*, G. E. Borden, Fall River.

ESSEX NORTH—*President*, G. E. Kurth, Lawrence; *Vice-President*, R. L. Toppan, Newburyport; *Secretary and Treasurer*, J. Forrest Burnham, Lawrence.

ESSEX SOUTH—*President*, O. S. Pettingill, Middleton; *Vice-President*, C. L. Curtis, Salem; *Secretary*, R. E. Stone, Beverly; *Treasurer*, Andrew Nichols, 3d, Danvers; *Librarian*, C. M. Cobb, Lynn.

FRANKLIN—*President*, A. H. Ellis, Greenfield; *Vice-President*, W. K. Clark, Greenfield; *Secretary and Treasurer*, Charles Moline, Sunderland.

HAMPDEN—*President*, E. P. Bagg, Jr., Holyoke; *Vice-President*, Dudley Carleton, Springfield; *Secretary and Treasurer*, H. L. Smith, Springfield.

HAMPSHIRE—*President*, F. E. O'Brien, Haydenville; *Vice-President*, L. B. Pond, Easthampton; *Secretary and Treasurer*, L. O. Whitman, Northampton; *Librarian*, F. H. Smith, Hadley.

MIDDLESEX EAST—*President*, D. T. Buzzell, Wilmington; *Vice-President*, F. T. Woodbury, Wakefield; *Secretary*, A. R. Cunningham, Winchester; *Treasurer*, Richard Dutton, Wakefield; *Librarian*, J. M. Wilcox, Woburn.

MIDDLESEX NORTH—*President*, J. H. Lambert, Lowell; *Vice-President*, A. G. Scoboria, Chelmsford; *Secretary*, T. A. Stamas, Lowell; *Treasurer*, M. D. Bryant, Lowell; *Librarian*, P. J. Meehan, Lowell.

MIDDLESEX SOUTH—*President*, A. W. Dudley, Cambridge; *Vice-President*, Fresenius Van Nüys, Weston; *Secretary*, S. M. Biddle, Cambridge; *Treasurer*, Edward Mellus, Newton.

NORFOLK—*President*, Victor Safford, Jamaica Plain; *Vice-President*, S. F. McKeen, Brookline; *Secretary*, F. S. Cruickshank, Dorchester; *Treasurer*, G. W. Kaan, Reading.

NORFOLK SOUTH—*President*, D. A. Bruce, Atlantic; *Vice-President*, G. M. Sheahan, Quincy; *Secretary, Treasurer and Librarian*, N. R. Pillsbury.

PLYMOUTH—*President*, T. H. McCarthy, Brockton; *Vice-President*, F. W. Murdock, Brockton; *Secretary and Treasurer*, L. B. Packard, Brockton; *Librarian*, J. H. Weller, State Farm.

SUFFOLK—*President*, Lincoln Davis, Boston; *Vice-President*, W. H. Robey, Boston; *Secretary*, A. H. Crosbie, Boston; *Treasurer*, John Rock, Boston.

WORCESTER—*President*, P. H. Cook, Worcester; *Vice-President*, A. M. Shattuck, Worcester; *Secretary*, C. A. Sparrow, Worcester; *Treasurer*, G. O. Ward, Worcester; *Librarian*, A. C. Getchell, Worcester.

WORCESTER NORTH—*President*, J. H. Kearney, Fitchburg; *Vice-President*, C. S. Brigham, Leominster; *Secretary*, C. H. Jennings, Fitchburg; *Treasurer*, F. H. Thompson, Jr., Fitchburg.

Fellow Members! We want your support.

The New England
Journal of Medicine

VOLUME 199 JULY 12, 1928 NUMBER 2

SPINAL ANESTHESIA FOR UPPER AND LOWER ABDOMINAL OPERATIONS*

BY L. F. SISE, M.D.†

REMARKS ON THIS TYPE OF ANESTHESIA FROM THE POINT OF VIEW OF THE OPERATING SURGEON

In discussing with Dr. Sise the question of presenting this preliminary report on the experiences in the Clinic with the method of spinal anesthesia herein described, for high and low abdominal operations, it seemed wise to us to present a few preliminary words as to the reaction of the operator to this type of anesthesia, particularly as relates to its advantages and disadvantages.

As stated under Dr. Sise's text, we have been seeking a better type of anesthesia for the abdominal cases, requiring prolonged operations, such as gastric, intestinal and rectal resections. There has been little question in the minds of all the members of the Clinic but that general anesthesia has definitely added to the mortality in the surgical management of these lesions. Likewise there has been little question but that regional anesthesia has definitely added to the difficulty in the way of exposure and ease of the surgical management of these lesions.

The spinal anesthesia of the past, up to the time of the development of the present plan, has been too dangerous as to uncontrolled heights of anesthesia, and also as to serious and and startling drops in blood pressure. In the method described in Dr. Sise's text, in at least so far as we have had experience, the procedure apparently eliminates these undesirable features and obtains for us a method of anesthesia which so far seems almost ideal, when applied to properly selected cases, that is, patients who are not too bad risks.

The advantages, as seen from the point of view of the surgeon, are the complete relaxation, the quietness of the abdominal contents, the lack of necessity of forcible retraction and of traumatizing viscerae by extensive walling off and retraction pressure. In addition, the fact that the intestines are contracted adds materially to the ease of exposure.

The main disadvantage, as seen by the operator, has been the limitation of time over which the anesthesia lasts, that is, one and one-quarter to one and one-half hours. There are but few cases, however, including gastric resections and combined abdomino-sacral removal of the rectum for cancer, which cannot be completed, particularly as to the abdominal portion, in the time during which the spinal anaesthesia lasts. The remainder of the operation is of short duration, and can be successfully completed with ethylene and local infiltration.

It is obvious, therefore, that this method of anesthesia is not applicable for those operators who habitually consume a period of time in their operative procedures of any considerable extent beyond one and one-half hours.

The combination of scopolamin and morphine (one-quarter grain of morphine and one one-hundred and fiftieth of scopolamin) two hours before operation, and repeated again one hour before operation in full sized adults, has in a majority of instances resulted in practically complete narcotization of patients, with almost entire elimination of any psychic irritability.

This feature which Dr. Sise has not brought out in his text, is ideally combined with the spinal procedure.

We were in the beginning somewhat disturbed concerning the disadvantages of inducing a general anesthetic, the spinal having worn off, on a patient whose abdomen was open with the intestines exposed, but several experiences with this procedure have demonstrated to us that within five minutes patients can be completely carried into deep ethylene anesthesia, with no undesirable effects upon the exposed bowel from straining.

It would be unwise, I am sure, for us to present our experiences with this method without urging strongly that it should not be undertaken by inexperienced anesthetists; that it should be used only on well selected cases with a complete understanding of the principles involved and of the maintenance of blood pressure by preliminary ephedrine. Also with an understanding of the danger of repeated doses of ephedrine.

We feel that we should further stress the warning that the tendency will be to apply this method to bad risk cases, and that its application will most certainly result in serious consequences; that the method should not be applied to extremely bad risk cases, but that it is most applicable in good risks who will be shocked by the necessity of prolonged operative procedures.

Bad risk cases, in our opinion, can still best be handled by the adjustment of the operative procedure to the limitation of regional anesthesia.

IN deciding upon a suitable anesthetic for abdominal operations, particularly for upper abdominal operations, we have in the past been confronted by something of a dilemma. If we avoided one side of this dilemma, we were sure to be confronted by the other.

1. We could give ether and obtain relaxation sufficient for these operations; but in so doing we exposed our patient to the injurious effects of deep ether anesthesia. Deep ether anesthesia predisposes to surgical shock[1]. This is now well recognized. The tendency to postoperative lung complications is also increased. This tendency, as compared with ethylene, has been very clearly shown by Lundy in the most convincing set of statistics probably ever published on this subject[2]. Deep ether also injures the parenchymatous organs of the body, the heart, liver, kidneys, and blood[3,4,5]. The in-

*From the Lahey Clinic, Boston, Mass.

†For record and address of author see "This Week's Issue," page 102.

jurious effects of ether are now very generally recognized, and this recognition is shown in the distinct drift from ether towards other forms of anesthesia.

2. We could protect our patient fairly well from the injurious effects of ether by giving some other anesthetic, such as regional or ethylene, or a combination of both; but in thus lessening the anesthetic danger, we increased the surgical danger. These forms of anesthesia give much less satisfactory relaxation than does ether, and consequently handicap the surgeon in his work. He is unable to expose the anatomy so clearly, and thus cannot perform his operation with the certainty, accuracy, and speed that he can with full relaxation. Being handicapped, he may sometimes limit his operation to a lesser procedure, where a greater one would really be indicated were he free to work unhampered.

It seems to us now that spinal anesthesia may well offer a solution of this dilemma.

1. Operative conditions with spinal anesthesia are extremely good. The relaxation is better than with any other anesthesia; the breathing of the patient is quiet and shallow; and the intestines are contracted. The result of these three conditions is that operating conditions are almost ideal, and the surgeon can do better and quicker work than he can with any other anesthetic. This is particularly noticeable in the upper abdomen, because here relaxation is ordinarily more difficult to obtain than in the lower abdomen.

2. The patient is not endangered by the anesthetic. His postoperative condition is distinctly better than with ether, and compares not unfavorably with that after ethylene and regional.

Spinal anesthesia has been in use for a good many years, but it is only within the last few years that the technique has been so improved that we have felt it a suitable anesthetic for routine use in abdominal operations. There have been numerous improvements in technique.

1. The chief recent improvement has been in the use of ephedrine. This drug given prophylactically just before the spinal injection maintains the blood-pressure satisfactorily in the great majority of cases. Thus at one stroke the greatest previous drawback to this anesthesia is largely eliminated. In addition, we are able, because of this, to work with more confidence with our anesthetic, we can give larger doses, we can run the anesthesia higher, and consequently our anesthetic results are more satisfactory.

2. There have been other refinements, less important, and not all of them new, but nevertheless a distinct advance. The first of these is the use of a non-diffusible or viscid solution. This tends to hold the anesthetic drug at the point where it is wanted and to prevent diffusion into other parts. If such a solution is not used the drug may diffuse upward and produce annoying and possibly injurious effects. By holding the drug at the point where it is wanted, these solutions enable us to get a deeper and longer anesthesia. By delaying the action of the anesthetic drug somewhat, as they do, they prevent the sudden advent of alarming symptoms, and they give us time to move the drug to the point where it is wanted. Pitkin's solution is of this kind[6]. His work in devising it has been original and valuable and a distinct contribution to the subject of spinal anesthesia.

Another improvement in technique is the use of solutions of different specific gravity from that of the spinal fluid. Babcock has for many years used one lighter than the spinal fluid[7], and Pitkin's solution is also of this kind. In 1920, Hepburn wrote of the use of a solution heavier than the spinal fluid[8]. This also had the advantage of lessening diffusion. In using this fluid, however, it was necessary to keep the patient more or less horizontal. He could not be put in the Trendelenburg position without danger of the heavy solution running toward the vital centers in the medulla. In the horizontal position the drop in blood pressure was rather distressing, and after a short trial we gave it up. The recent use of ephedrine, however, has again enabled us to use this technique, and we have found it a very valuable one.

While spinal anesthesia has been for us a very good solution of this dilemma, it has, of course, some disadvantages.

1. It has been reputed to be dangerous, and numerous undesirable postoperative complications have been ascribed to its use. Unquestionably, with improper selection of cases, improper technique, or inefficient care during anesthesia, there may be complications and deaths. It is not a method for promiscuous use. But when given with discrimination and care by those well experienced in its use, the results are remarkably good. In this connection Babcock's report of 15,000 inductions is very interesting[7]. In his first 5,000 cases he had ten deaths and many narrow escapes, six abducens palsies, one posterior radiculitis, and many severe headaches, while in about ten per cent. of his cases the anesthesia was unsatisfactory. In his last 10,000 cases there were no deaths, no palsies, and rather uncommon headaches, while the anesthesia was almost uniformly satisfactory. All of us now have the benefit of his experience and the benefit of better anesthetic drugs and of the other improvements mentioned above, and with care should, therefore, be able to do as well.

While our own experience is too limited to be of much value as statistics, in the 350 total cases which we have done we have had no deaths directly attributable to the anesthesia, no palsies, and but a few headaches. In one case, indeed, a case of respiratory paralysis, to be mentioned later, death may have been due indirectly to the anesthesia, inasmuch as he died of pneumonia on the fourth day. On account of kidney disease, respiratory infection, age, and general

condition he probably could not have taken ether. Against this case should be credited several uncounted cases whose lives we believe were saved by the use of spinal anesthesia. The technique mentioned in this paper we have employed only since February, and, because of this and a scarcity of solutions at times, have used it in but 109 cases up to June 1.

2. There are occasionally failures to produce satisfactory anesthesia. With the use of solutions of different specific gravity from the spinal fluid, which can be run to the desired point by proper position of the patient, failure to get proper location of the anesthesia should be practically eliminated. The only instances in which this is likely to occur are where it is thought that the anesthesia is high enough, but where the progress of the operation proves that it is not. If it is definitely seen that the anesthesia is not high enough before the operation is started, a second injection can be given. In a few cases it is impossible to puncture the dura and obtain spinal fluid. These cases are chiefly in individuals with spinal arthritis and a rigid spine. A few individuals are of too nervous and unstable a temperament to stand the procedure. The use of preliminary narcotics such as morphine and scopolamine reduces this group very greatly. If the patient is still too nervous, a light gas anesthesia may be given. This gives him, without injurious effects, the unconsciousness which he wishes, while the excellent relaxation of spinal anesthesia is still retained.

3. The anesthesia cannot be accurately fitted to the length of the operation. The dose once given and the operation started, nothing can be done to change the length of the anesthesia, and, in fact, the length is somewhat uncertain, varying with different individuals. However, if it is felt that the operation is to be a long one, we can get in upper abdominal operations with a fair amount of certainty, an hour's operating time, usually more, and in lower abdominal operations, a somewhat longer time. This will cover most operations. If the operating time runs beyond the length of the anesthesia, the latter can be pieced out with ethylene. By this time most of the procedures requiring deep relaxation or of a shocking nature have been finished. Ethylene alone will usually carry the patient along up to the time of closing, when a moderate amount of added ether, usually for no more than ten minutes, will be sufficient for closing. This amount of general anesthesia is sufficient for the conclusion of the operation, but is not enough seriously to affect the patient.

TECHNIQUE

The technique of spinal anesthesia may vary somewhat between two men who get equally good results. The following methods, while they may vary somewhat from those of others, seem to us sound, and have given good results in our hands.

Food should be withheld before spinal anesthesia just the same as before a general anesthesia, since vomiting occasionally occurs during the operation and because a supplementary general anesthesia is occasionally necessary. It is rather important to empty the lower bowel by enema. Spinal anesthesia relaxes the anal sphincter and contracts the intestines. An involuntary movement is the necessary result of this if there is anything in the bowel.

A preliminary narcotic is a help to any patient, and is a great help to a nervous one. This can be adjusted according to the age, vigor, and temperament of the patient. We commonly give one-fourth grain of morphine and one-one-hundredth grain of scopolamin. If this is not sufficient, we may give a second dose of about one-third the size of the first. In the most desirable condition the patient becomes an automaton. He does unquestioningly what he is told, and as soon as he is let alone he falls asleep.

The spinal needles should be of some rustless material. Ordinary steel needles are dangerous. Their inner surface may rust badly without the outer, nickeled surface showing any sign of it. This weakened needle may then break between the spinous processes during puncture. Nickeloid makes a very good material, or rustless steel of the proper temper. We believe nickeloid less likely to break, though it is not quite so easy to use, as it is somewhat more pliable. Three inches is a convenient length, though a second needle of three and one-half inches should be on hand to use with the very fat. The gauge should be as fine as can be used readily, as the liability to post-operative headache varies with the size of the needle. Nos. 20 to 22 are usually satisfactory. A long, bevelled, sharp point should not be used. With such a point it is possible to have part of the opening inside the dura, and part outside. Thus, although spinal fluid may be obtained freely, part of the injected fluid may run outside of the dura and unsatisfactory anesthesia result. On a small needle a bevel of forty-five degrees is satisfactory. Personally we prefer the conical point recommended by Greene[9]. This point may be said to be bevelled all the way round, giving a point like a trocar or blunt cambric needle. The advantage of this point is that the longitudinal fibres of the dura are not cut, as with other needles, but are simply pushed apart, so that they may close again readily. This, like the small gauge needle, lessens leakage and post-operative headache.

Syringes of from three to ten mils capacity may be used. Five mils is a handy and useful size.

The eyes should be covered while the patient is in the operating room. A towel laid on them is entirely ineffective, as it easily falls off with change in the patient's position. A comfortable and effective blinder may be made by fastening a piece of absorbent cotton in the hollow of

each eye by means of a single narrow strip of adhesive plaster across the face.

It seems unnecessary to state that in the technique of induction absolute asepsis should be used throughout. The back should be prepared, implements boiled, and gloves worn as for an abdominal operation. The easiest error to make is in the sterilization of the surface of ampules. Placing the ampules in alcohol for a few minutes is not enough. Probably the best plan is to scrub them thoroughly, rinse them, and keep them in Harrington's or some similar solution, and rinse them in sterile water just before using. Or they may be boiled. Repeated boiling, however, injures the solutions.

The best position of the patient when the puncture is made is on the side, nearly horizontal. If the puncture is made with the patient sitting up, he may get dizzy or faint or may vomit. This is particularly apt to occur if he has been given much preliminary narcosis. If this position is used when solutions of different specific gravity from the spinal fluid are employed, the position must be changed very quickly after the injection is made. These various considerations, therefore, make the first mentioned position the best.

The site of puncture may be any convenient lumbar interspace below the first. As the end of the cord occasionally comes as low as the body of the second lumbar vertebra, it is well to keep below this point if it can readily be done. We most commonly use the third lumbar interspace, going elsewhere only if this space presents special difficulties. In a recent case of rigid spine we had to drop to the lumbar sacral space before being able to make a puncture, but obtained a perfectly satisfactory abdominal anesthesia from this point.

Preliminary local infiltration at the site of puncture with novocain makes the patient more comfortable and helps him to maintain the correct position quietly during the actual puncture. A one per cent. solution containing also the required dose of ephedrine may be used for this purpose, thus saving one separate step.

Ephedrine resembles epinephrine in that it contracts the arterioles and produces a rise in blood pressure. This rise in pressure, however, is caused somewhat more by stimulation of the heart than is the case with epinephrine. Ephedrine differs also in being quite effective when given subcutaneously. Its action lasts very much longer than is the case with epinephrine, 50 mgm. lasting for from one to two hours. It is much more effective in maintaining blood pressure than it is in elevating the pressure when this has once dropped. The ordinary dose of ephedrine preliminary to spinal anesthesia in most individuals is 50 mgm. Seventy-five or 100 mgm. may be used. The dangers of the larger doses will be discussed later.

In making the spinal puncture with needles of the size recommended, it is quite difficult, on account of the pliability of the needle, to puncture the skin, especially if the conical point of Greene is used. For this reason it is well to make a preliminary puncture of the skin of a size which will just admit easily the needle to be used. This has the added advantage that the preliminary puncture lessens the danger of infection being carried from the skin inward on the spinal needle. The spinal needle is inserted just through the skin; then with the thumb of the left hand placed on the skin, just to the left of the needle, the skin is moved upon the back till the point of the needle is at the desired position. This position is in the center of the interspace, and the needle is introduced straight in at right angles with the plane of the back. With the fine-gauged needle and the conical point, the snap encountered in piercing the dura is so light that it is frequently not felt. Instead, there is a feeling of lessened resistance just after having passed a point of slightly increased resistance. An annoying form of tap is that in which, although fluid flows freely from the end of the needle, yet, when suction is made with the syringe, this flow immediately stops. If only very gentle suction is made, fluid can sometimes be obtained under these circumstances. Rotating the needle or changing its position slightly may help. When the puncture is made, the anesthetic solution to be used should be ready at hand in the syringe. When the syringe is attached, it should be very carefully steadied, together with the needle, by means of the left hand, the back of which is placed firmly against the back of the patient. A slight movement outward of the needle at this time may be sufficient to pull its point outside of the dura, so that the solution, when injected, would fail to produce anesthesia. It is well at the beginning and at the end and, if there is a considerable volume of solution also during the middle of the injection, to make slight withdrawal with the syringe, to be sure that there is still a free flow of fluid. This makes it certain that the point of the needle is still within the dura.

The dose of novocain used when employing the non-diffusible solutions should be somewhat greater than when plain novocain is used alone. For short operations in the lower abdomen, like a simple ovarian cyst, or appendix, 200 mgm. may be used. For longer ones, or where the abdominal operation follows a vaginal repair, 300 mgm. is more certain to last through the operation. For most upper abdominal operations 250 to 300 mgm. may be used. On at least four occasions, where an injection of 300 mgm. has failed to produce anesthesia of the height desired, we have injected a second dose of 100 mgm., making a total of 400 mgm. In each case the results were entirely satisfactory, and the desired level was obtained. The dose should be varied somewhat according to the size and vigor of the patient.

We employ both a heavy solution and a light

solution, using one or the other according to circumstances.

For most upper abdominal operations, the heavy solution seems preferable. This is essentially the solution described by Hepburn in 1920. It consists of 5 per cent. glucose in salt solution. Hepburn used stovain. For this we have substituted novocain in the proportion of 100 mgm. to each mil of solution. This solution is not on the market, but may be made up by anyone desiring to use it. If desired, it may be put up in ampules and keeps fairly well. All materials used in putting it up should be efficiently sterilized, (autoclaved). It is well, in addition, to pasteurize the ampules after they are filled. This may be done by heating them to 65° Centigrade for one-half hour on three successive days. This does not injure either the appearance or the potency of the solution. The ampules may be boiled once. This turns them somewhat yellow, but lessens their potency only slightly, if at all.

It seems probable that before long a solution heavier than the spinal fluid will be put on the market.

Hepburn gives the specific gravity of his solution as 1031. As the specific gravity of the spinal fluid in adults runs from 1004 to 1007, this solution, when injected, tends to run to the lowest point. In making the injection, therefore, the head of the table should be tipped down from 5 to 10 degrees, depending somewhat on the figure of the patient. With women, whose hips are larger than men's, the table should be tipped somewhat less than when the patient is a man. At the same time, the head of the patient should be kept well up. The mattress should be strapped tightly to the table to prevent slipping. It is unnecessary to mix spinal fluid with the solution before injecting it. Only enough need be withdrawn to make sure that the point of the needle is in the proper location. Before making the puncture, the iodine, if this is used, should be cleaned from the back so that the patient shall be ready, immediately the puncture is made, to be turned onto the back. When turned on the back, he should be arranged so as to exaggerate greatly the normal dorsal curve. This can be done by raising the head and shoulders on pillows. A goiter bridge is quite a help in doing this. If placed under the head with a pillow on it, it can be raised to any desired height. With the patient in this position, the table can be tipped one way or another so that the most dependent portion of this dorsal curve will come at the point where it is desired that the bulk of the solution shall be. Anesthesia should be tested for not later than two minutes after the injection and its progress kept close track of, so that, should it not approach readily the desired point, the table can be tipped somewhat more. When a small amount of solution is used it can be shifted by tipping the table for but a minute or two after the injection. When a large amount is used it can usually be shifted for perhaps five minutes. After these intervals, while the solution may move, yet this cannot be depended upon to change the height of anesthesia. The solution is moved most readily immediately after injection.

Before the anesthesia has reached to the desired height, the table should be leveled off so that the head is raised and the progress upward of the anesthesia is checked. There is a lag in time between the arrival of the anesthetic solution at a given point and the appearance of anesthesia in the region corresponding to that point. Consequently, the anesthesia must be checked somewhat before it reaches the desired location. We usually plan in all abdominal operations, even in the lower abdomen, to have the anesthesia reach eventually to the ensiform. This is done so that, if necessary, the abdomen may be explored, and so that, should some further procedure than was originally contemplated, be necessary, the anesthesia will still be sufficient. For operations in the upper abdomen, the anesthesia should be at the fourth rib. After the anesthesia has reached its highest level for the time, there is a slow diffusion upward during the course of the operation. This diffusion upward varies with the amount of anesthetic solution used, being greater with the larger amounts and less with the smaller ones. It seldom exceeds 2 or 3 spinal segments.

Having gotten the anesthesia to the desired level, the table is placed so that the patient is just off the horizontal position, the head of the table being slightly lower than the foot, usually at an angle of about two degrees. The head of the patient, however, and the shoulders, if the operation is a lower abdominal one, should be slightly elevated. A disadvantage of this solution is that the patient cannot be put in Trendelenburg position, as the solution will tend to gravitate toward the medulla. The head of the table can, however, be raised somewhat with certain patients, if this is necessary. Such patients would be young patients with a good circulatory system who had had a somewhat large preliminary dose of ephedrine.

Hepburn, in his article, stated that the head should be kept up for six hours after the injection is made. This seems to us longer than necessary. Two hours with the body level and the head on a pillow seems more than long enough as far as any possible motion of the anesthetic fluid is concerned. It is true, however, that after any lumbar puncture the tendency to headache is lessened by keeping the patient flat for some time.

Between January 1st and June 1st of this year, we have successfully performed one pancreas, nine stomach, and thirty-three gall bladder operations under spinal anesthesia, besides six general explorations requiring high anesthesia.

For lower abdominal operations, and especially for any abdominal operation which may require the Trendelenburg position, the light solution devised by Dr. Pitkin is excellent. Together with a novocain-ephedrine solution it is produced by H. A. Metz and marketed under the name "Spinocain." Its specific gravity it 1000.5. Thus, being lighter than the spinal fluid, it gravitates to the highest point. In making the injection, therefore, the head of the table should be up 5 to 10 degrees. Care must be taken, particularly with women, that, even though the trunk as a whole slants upward, the lumbar region is not curved so that at the point of injection the spine slants down instead of up. Not infrequently it is well to place a pillow under the flank, to correct this tendency. The thickness of this solution tends to delay or even prevent somewhat the action of the novocain. It is well, therefore, to dilute it by drawing spinal fluid into the syringe and mixing it with the solution. Dilution with an equal part of spinal fluid works well. It is not so necessary here to turn the patient quickly on the back, as when in that position the dorsal curve runs in the wrong direction. The anesthesia should be tested for and the table tilted in accordance with its progress, as was mentioned with the heavy solution; but the tilt recommended during injection should not be maintained for more than a minute at the most. Usually one half minute is enough. The lag in time with this solution is greater than it is with the glucose solution, and suitable allowance must therefore be made for it. Care should be taken throughout this procedure to keep the patient's head as low as possible, allowing him no pillows. When the anesthesia is to be checked, the table should be put in Trendelenburg position. About 5° is right for the high anesthesias, and more for the low ones. When a definite height of the anesthesia has been reached, slow diffusion upward during the course of the operation will be found to be less than with any other solution. Indeed, in most cases it is practically negligible.

The anesthesia having been attained and the patient placed on his back ready for operation, it is well to see that the hands and arms are properly restrained. Patients who have had a considerable amount of preliminary narcotic occasionally wander mentally and do not know what they do with their hands. Should a general anesthetic be necessary in addition, the hands may become free during the period of induction. For these reasons they should be fastened firmly at the sides. Straps with wrist-bands made for the purpose are reasonably satisfactory in most operations. In one of our cases, however, a hernia, though the wrists were held firmly to the table, the patient managed to curve his hand upward and insert his fingers in the operative field. Fortunately no harm resulted. With hernias, therefore, and in places where these straps are not available, a sheet may be used for restraint. This sheet is folded lengthwise so that the full length of the sheet is available and so that it is about two feet broad. This is then folded as if it were a letter S which had been sat on and crushed flat. This is placed under the patient and an arm is inserted in each of the loops thus formed. Two people, one on each side of the table, then pull on the free ends of the S and tighten the loops on the arms to the desired point. While this is somewhat fussy and time-consuming to arrange, it is a very efficient and comfortable means of restraint.

The duty of the anesthetist during an operation under spinal anesthesia is usually simple in the extreme, and consists in keeping track of the condition of the patient and perhaps attending to minor discomforts which he may have. Some patients, especially those who are very stout, are apt to become somewhat cyanotic if put in high Trendelenburg position. Such patients should receive oxygen. If the respiration is depressed from preliminary medication, the face slightly cyanosed, and the blood pressure somewhat low, carbon dioxid will frequently work a great improvement. Putting the table in a slight or moderate degree of Trendelenburg is an aid in combatting a slight drop in blood pressure. The head of the table should not be raised, except in a very few instances under the conditions mentioned above, as a considerable drop in blood pressure may result.

The anesthetist may, however, be called upon to exercise all his judgment and skill in correctly interpreting the patient's condition and in rendering efficient treatment, at a moment's notice, if necessary. The most common condition demanding this during spinal anesthesia is an undue drop in blood pressure. This brings up the question of what should be considered an undue drop in pressure. No rule can be laid down which will cover all details, as one patient may be completely prostrated by a drop in blood pressure which has little apparent effect on another. In general the aged and sclerotic are more affected than are the young and elastic. We have felt that, in a very rough way a systolic pressure of 80-90 was satisfactory, that one of 60-70 was getting questionable, that 50 was distinctly unsatisfactory, and that 40 or below was dangerous.

We do not feel that it is well to try to maintain the blood pressure at or near the original level, unless this is easily done with small preliminary doses of ephedrine. A moderate drop in pressure appears to do no harm. It is not like the drop in shock, where a vicious circle appears to be formed from which it is hard to pull out. The drop experienced in spinal anesthesia is one which normally reverses itself as the anesthesia wears off, when the patient seems to be none the worse for it. (An apparent exception to this is where the two forms of drop are mingled together.)

If the drop in pressure is such as to require

treatment, one would naturally think of giving a second dose of ephedrine. This, however, is frequently not satisfactory and may be dangerous. This drug is much more effective prophylactically than it is therapeutically. If the blood pressure has once become lowered, its action is very often disappointing. If it is given subcutaneously under these circumstances, no effect can usually be detected. If it is given intramuscularly and massaged, its characteristic action can usually be detected within a few minutes. Even here, however, the rise in pressure which it causes is usually disappointing. We now rarely give a second dose. We try rather to give before the induction all that will ultimately be needed.

With patients in whom myocardial weakness may be suspected, it is better not to give the second dose of ephedrine, as the added peripheral resistance which it causes may place too great a strain upon the heart. In a previous article we have called attention to the fact that ephedrine, even in moderate doses, may cause extra systoles and acute cardiac dilatation, and that the heart is more susceptible to its depressive action when the blood pressure is low[10]. In these heart cases, therefore, and also in those cases that have had a second dose of ephedrine, but whose pressure still remains too low, salt solution intravenously may be used. It is probably both safer and more efficient than further doses of ephedrine. Small doses of epinephrine may be added to the salt solution, beginning with 1 m. and working up cautiously, as indicated. Large doses should not be suddenly added as these may produce a rapid, tremendous, and harmful rise in pressure. It is a question also whether synergistic action does not exist between ephedrine and epinephrine[11]. This constitutes an added reason why great care should be used with epinephrine after ephedrine.

The proper use of these three substances, ephedrine, salt solution, and epinephrine, calls for good judgment on the part of the anesthetist. On the one hand their use at the right time may save the patient from collapse; and on the other hand their use at the wrong time may precipitate heart failure and death. The patient who is pale, perhaps slightly cyanosed, with collapsed veins and low blood pressure, calls for their use. The one who is distinctly cyanosed and who shows dilated veins is probably better off without them even though the pressure is low. In our early use of ephedrine, when we used it more freely than at present, we saw several patients in this condition after large or repeated doses of ephedrine, when in the Trendelenburg position. The breathing of pure oxygen caused no appreciable improvement in their color. We believe they were not far from heart failure, though fortunately all returned to normal in a short time.

We know of two cases, not in our experience, however, who were not so fortunate. Each was in very poor general condition. Each was in moderate Trendelenburg during the operation. Each was given repeated doses of ephedrine totalling about 150 mgm. They became cyanotic, fibrillated, and, though the pressure was at or above normal, died in about twelve hours.

These cases are cited to emphasize the danger of too much ephedrine in the presence of a weak heart. If something more than the preliminary use of ephedrine is needed, salt solution or epinephrine seems safer. The action of ephedrine is prolonged and cumulative. But salt solution may be stopped at any time, while the action of epinephrine is very short-lived. With this latter, however, care must be taken that possible synergistic action with ephedrine does not start prolonged and too vigorous action from the latter.

Should paralysis of respiration supervene, it may easily be handled by artificial respiration, using enough oxygen to keep the color normal.

In our own experience we have never seen such a drop in blood pressure that we have felt it necessary to use salt solution during the operation. The average drop in systolic blood pressure from that before operation has been less than twenty per cent. We have seen partial paralysis of respiration a number of times, but have felt that the patient needed help in only one instance. In this case, while the patient was still able to breathe, he could do so only with difficulty and considerable exertion, and was anxious and restless in consequence. A little help to his respiration by means of the breathing bag quieted him immediately, and by the end of the operation, about 45 minutes, he was breathing normally without assistance. This is the case, mentioned earlier, who died of pneumonia on the fourth day.

While considering the treatment of the complications occurring during this form of anesthesia, it would be well to mention the conclusions reached by Babcock[12]. He has probably employed spinal anesthesia longer and has done a larger number of cases than anyone else in America. His splendid results in 10,000 cases were mentioned above. From his rich experience with this method of anesthesia he has formulated three rules for safety as regards the circulatory system:

1. There should be a proper selection of cases.
2. The patient should be watched carefully during the anesthesia.
3. Proper methods of resuscitation should be employed when necessary.

While ephedrine has made spinal anesthesia much safer and has broadened its field of usefulness, yet we would do well still to bear in mind these three rules, as occasional cases are still encountered in which alarming symptoms may occur.

1. Our first duty is the proper selection of

cases. Those in very poor general condition, whether this is the result of acute causes, such as shock, hemorrhage, or sepsis, or whether it is the result of prolonged illness, make poor subjects for spinal anesthesia. Ephedrine contracts the arterioles and stimulates the heart. If the patient's cardiac and general condition is not sufficiently good to handle the increased peripheral resistance which results, or to respond to the stimulation, alarming and possibly fatal results may follow. Such patients usually do well with regional anesthesia and ethylene.

2. It should be the sole duty of an experienced person to watch the patient during the course of the operation and as long thereafter as his condition requires it. Regular and frequent observations should be taken of the pulse, blood pressure, breathing, and color. If this is done the patient cannot experience circulatory collapse or respiratory paralysis without the fact being detected in time to employ adequate treatment.

3. Adequate facilities should be at hand and immediately available for the treatment of urgent symptoms. Should the patient go into collapse and become pulseless, time is of the utmost value, and may spell the difference between life and death. Consequently the necessary equipment should always be sterilized and ready for instant use[13].

In conclusion, spinal anesthesia, as outlined in this paper, seems to give to surgery possibilities otherwise unattainable, in that by its use cases can be done that are so difficult surgically as to be virtually impossible under any other form of anesthesia, and at the same time cases can be carried through to a successful conclusion that are so poor in physical resources that they would probably succumb to a relaxing general anesthetic.

SUMMARY

Spinal anesthesia is the anesthesia of choice for abdominal operations, because it combines intense relaxation with freedom from injurious after effects as does no other form of anesthesia.

A technique for this form of anesthesia is described in some detail, together with suggestions for the treatment of circulatory depression.

It is not a method for promiscuous use; but if cases are properly selected, if they are properly watched, and if proper means of treatment, immediately available, are discreetly used, it is safe.

REFERENCES

1 Cannon, W. B.: Traumatic Shock. New York: D. Appleton & Co., 1923.
2 Lundy, J. S.: Med. Jour. and Record, 2333:87-93 (1926).
3 Stander, H. J.: Amer. J. Obstet. and Gyn., 12:633-654 (1926).
4 Rosenthal, S. M., and Bourne, W.: J. Amer. Med. Assn., 90:377-379 (1928).
5 Yates, J. L., and Raine, F.: Ann. Surg., 87:124-129 (1928).
6 Pitkin, G. P.: J. Med. Soc. N. J., 24:425-438 (1927).
7 Babcock, W. W.: Penn. Med. J., 26:303-312 (1923).
8 Hepburn, W. G.: Amer. Jour. of Surg., Anesthesia Supp., 34:87-89 (1920).
9 Greene, H. M.: Northwest Med., 22:240-245 (1923); J. Amer. Med. Assn., 86:391-392 (1926).
10 Sise, L. F.: Surg. Clin. No. Amer., 8:195-200 (1928).
11 Althausen, T. L., and Schumacher, I. C.: Arch. Int. Med., 40:851-872 (1927).
12 Babcock, W. W.: Anesth. and Analg., 4:222-228 (1925).
13 Babcock, W. W.: Anesth. and Analg., 3:208-213 (1924).

NOVOCAINE IN THE REDUCTION OF FRACTURES

BY HILBERT F. DAY, M.D., F.A.C.S., AND WALTER S. LEVENSON, M.D.*

IN the Surgical Clinic of the Boston Dispensary we have had the opportunity of beginning a series of cases of fractures reduced under novocaine anesthesia. Two cases were recently treated by this method. One we will report here rather fully:

CASE 1. Miss G.—age 20, fell on the ice while skating 19 hours before being seen by us. Within an hour after the accident, she was seen by her local M.D. who diagnosed a fracture of the right wrist. After pulling strongly on the hand, a splint was applied and the patient advised to go to the Dispensary for X-ray.

When seen in the clinic, the right wrist showed the typical deformity of a Colles Fracture. X-ray showed the dorsally displaced and impacted terminal fragment of the radius (plate 1) and also a small fragment off the styloid of the ulna.

The wrist was painted with mercurochrome (10%) and 1% novocaine solution was injected anteriorly and posteriorly into the line of fracture, about 1 c.c. being used in each position. One half a c.c. was injected into the region of the ulna fracture.

Almost immediately the patient removed her supporting hand and began to move the injured wrist in all directions, showing that the pain and the accompanying spasm were gone. The impaction was broken up in the usual manner and an anterior and posterior moulded plaster paris splint applied. X-ray showed good position (plate 2). The splints were removed and replaced every five days to allow gentle massage and after three weeks they were left off. Function was practically complete.

CASE 2 was that of an elderly man, 65, who was injured four days before being seen. The right wrist was greatly swollen and ecchymosed. While being examined, the patient had three attacks of what appeared to be petit mal.

X-ray showed a comminuted fracture of the distal end of the radius with dorsal displacement of the fragments and several lines of fracture going into the joint. There were fragments in the joint line. Under novocaine, manipulation was made and X-ray showed only slight dorsal displacement but a clear joint. The patient did not coöperate in his after treatment, but when last seen, three and one half weeks after his injury, the swelling was practically gone and the wrist motion in all directions was returning satisfactorily. There was marked thickening at the fracture site.

That novocaine can be used for the reduction of fractures has been shown, and one of us has

*For records and addresses of authors see "This Week's Issue," page 102.

CASE 1—NO. 1.

CASE 1—NO. 2.

had the opportunity of watching Professor Bohler at The Accident Hospital in Vienna where general anesthesia for the reduction of fractures is very rarely used.

In the reduction of simple fractures, novocaine can be used quickly and it finds a real place where general anesthesia is not available or is contra-indicated. The same anesthesia lasts about one and a half hours and more than one reduction is possible if X-rays indicate it.

CASE 2--NO 1.

CASE 2—NO. 2.

LOCAL ANESTHESIA IN FIRST AND SECOND STAGE LABOR*†

Preliminary Report

BY DAVID ROSE, M.D.‡

THE use of local anesthesia in obstetrics is by no means new or unknown. It has been used for a great many years for abdominal section and less extensively for vaginal deliveries. Hitherto it has not, to my knowledge, been applied to the first stage of labor.

In a small series of cases at the Boston City Hospital we have employed local anesthesia for first and second stages of labor. This is based upon the anatomical and physiological factors concerned in the production of pain. During the primary stage of labor, pain is referred to the abdomen by contractions of the uterus. By paralyzing the sensory nerve endings in the skin with novocain, in those areas to which pain is referred, it is possible for labor to continue without the pain reflex. The only pain then experienced is in the back and this primarily is due to direct action on the sacral plexus, and often this is only slight. Secondarily, this back pain is associated with dilatation of the cervix.

When the cervix has become fully dilated and taken up i. e., second stage of labor, pain is experienced in the perineum and vulva. This of course is due to direct action of the presenting part on the pelvic floor. Namely, the levators, the perineum and hymeneal ring. Infiltration of these parts insures complete absence of pain in this stage.

Cases:—

A—First stage infiltration.

1) R. S.—Para I

Admitted to the hospital in active labor at 7:00 P. M. Membranes intact. Cervix one finger dilated. Abdominal infiltration performed. No pain complained of until 5:00 A. M. At 11:45 second stage commenced. Perineum and levators infiltrated and patient delivered normally at 1:55. No tear. No further anesthesia needed.

2) E. A.—Para III

Admitted in active labor. Cervix two and a half fingers and almost fully dilated. Abdomen was infiltrated at 11:45 P. M. Normal delivery at 3:00 P. M. No pain complained of during the remainder of first stage.

3) M. F.—Para I

Patient entered the hospital in active labor at 9:50 A. M. Membranes ruptured. Os three fingers dilated and the cervix taken up. Abdomen infiltrated. No further pain of first stage.

4) C. L.—Para I

Admitted in active labor complaining of considerable pain. Abdomen infiltrated at 8:00 P. M., at which time she was three fingers dilated and almost completely taken up. She delivered at 11:50 P. M. No abdominal discomfort after the infiltration.

5) R. McK.—Para II

Entered hospital in active labor. Cervix found four fingers dilated. Head high mid. Abdominal infiltration at 2:00 P. M. Slight discomfort began at 6:45 P. M. Delivered at 8:45 P. M.

6) E. C.—Para IV

Admitted at 6:45 P. M. in active labor. Abdomen infiltrated. Head low mid. Delivered at 8:25 P. M. No abdominal pain.

7) A. O'C.—Para I

Patient entered hospital at 10:00 A. M. in active labor with os dilated one finger. Abdomen infiltrated at 10:15 A. M. At 5:25 pain began to make patient uncomfortable and she was re-infiltrated. At this time she was three fingers dilated. At 7:30 the perineum was infiltrated and at 8:55 she was delivered by low forceps. No pain experienced. No ether used.

8) M. F.—Para I

Admitted to hospital at 2:00 P. M. in mild labor. At 5:40 P. M. she complained of abdominal pain. By rectal examination she was two and a half fingers dilated. Abdomen infiltrated. Delivered at 7:25 P. M. No abdominal pain during first stage.

9) C. M.—Para II

Labor started at 12 M. At 6:45 A. M. the abdomen was infiltrated. At which time cervix was thick, two fingers dilated and head high. At 11:15 A. M. began to have a return of abdominal pain and at 12 N. pain in abdomen was severe. Vaginal examination showed membranes intact with cervix taken up. Four fingers dilated and head at high transverse. Delivered by high forceps under ether.

10) S. G.—Para I

Admitted at 10:00 P. M. in mild labor. At 11:40 began to have severe pains in abdomen. Infiltration performed. No pains until 6:15 A. M. Cervix one and a half fingers dilated. At 11:00 A. M. was three fingers dilated with a high mid posterior head. Delivered by high mid forceps at 5:45 P. M. under ether.

Second stage infiltration.

1) M. F.—Para I

After first stage infiltration patient was infiltrated for second stage at 10:30 A. M. After 45 minutes without progress delivery performed by low forceps without recourse to general anesthesia. No perineal tear.

2) F. S.—Para I

Admitted to hospital with head practically on the perineum. Perineum infiltrated. Patient delivered normally without laceration. No further anesthesia required.

3) C. S.—Para II

Admitted in active second stage labor. Perineum and levators infiltrated. After 20 minutes she delivered normally with a one degree laceration which was repaired without additional anesthesia.

*From the Gynecologic and Obstetric Service of the Boston City Hospital.

†Received for publication June 11, 1928.

‡For record and address of author see "This Week's Issue," page 102.

4) A. O'C.—Para I

At 7:30 P. M. patient started second stage of labor following a first stage under local. With onset of second stage, perineum, etc., were infiltrated. Low forceps delivery at 9:00 P. M. Second degree tear obtained and repaired. No general anesthesia employed.

5) A. C.—Para IX

Patient admitted to hospital with head practically on perineum. Perineum infiltration performed at 7:05 P. M. Normal spontaneous delivery at 7:45. No perineal tear. No general anesthesia used.

6) F. McL.—Para I

Following an uneventful first stage under local, at 7:30 P. M., head was found to be low with cervix three and a half fingers dilated. Perineal infiltration performed. Delivery by low forceps accomplished at 9:10. One degree tear obtained and repaired. No general anesthesia. No complaints.

7) M. H.—Para II

First stage under local. Second stage noted at 12:10 A. M. Perineum infiltrated at this time. Normal spontaneous delivery at 1:30 A. M. No general anesthesia. No pain or discomfort.

The cases cited above serve as an illustration of the possibilities held out by local anesthesia. A further communication of a large series will take up in detail the technique and results.

GOOD SANITATION FOR FAIR GROUNDS

During the next two months great activity will be apparent around Connecticut fair grounds in preparation for the "big show". To safeguard the health of the many who are gathered together at such times the State Department of Health has recently issued a new chapter in its Sanitary Code—Rules and Regulations for Fair Grounds. These are printed in full below:

REGULATIONS GOVERNING SANITATION OF PUBLIC FAIR GROUNDS

Reg. 122. No public fair grounds shall be used except after full and literal compliance with the following regulations:

Water Supply

(a) Any water supply available for drinking or washing dishes on the fair grounds shall be of safe sanitary quality.

(b) Any water found unsafe for human consumption on such grounds shall be either eliminated or purified by a process approved by the State Department of Health or shall be kept posted with placards definitely warning persons against its use.

Disposal of Excreta

(c) Fly-tight privies or water-flushed toilets with a system of sewage disposal approved by the State Department of Health shall be provided and shall be maintained in a clean and sanitary condition. Separate installations for men and for women shall be provided and they shall be adequate for the accommodation of all persons attending or using the fair grounds. The location of all toilets shall be plainly indicated by signs.

Disposal of Refuse

(d) Supervision and equipment sufficient to prevent littering of the ground with rubbish, garbage or other refuse shall be provided and maintained. Fly-tight depositories for such materials shall be provided and conspicuously located. These depositories and any final places of disposition shall not be permitted to become foul smelling or unsightly or breeding places for flies.

Storage and Service of Food

(e) All foodstuffs stored or exposed for sale must be protected from flies and dust by suitable covers. The term "foodstuffs" includes both raw and cooked foods, candy and any other food not sold in single service fly-tight containers, except food in the process of cooking.

Single service cups, dishes, spoons and drinking straws shall be protected from flies and dust. All glasses, cups, spoons or dishes that are subject to repeated use shall be thoroughly washed after use by cleansing with hot water and soap, and then rinsing in clean hot water, or by other process approved by the State Department of Health.

Drinking Beverages

(f) All drinking beverages not bottled must be kept in fly-tight containers, from which the liquid may be removed only by faucets.

BOSTON CITY HOSPITAL

Staff Clinical Meeting, February 23, 1923

HEALING AND HEALED VEGETATIVE (SUBACUTE BACTERIAL) ENDOCARDITIS

BY SOMA WEISS, M.D., AND CORNELIUS P. RHOADS, M.D.*

THE nature of disease changes but seldom, our conception of it frequently. When the mutations brought about by disease processes are observed at postmortem examination it is often possible to reconstruct the conditions which existed during the life of the patient. From a series of such observations a new understanding of a well recognized clinical entity may be built up. Such a modification of conception, as a result of morphological and bacteriological studies by numerous investigators, has occurred during the recent years in subacute bacterial endocarditis.

Observations of patients and of autopsy material suggest that the prevailing ideas of subacute bacterial endocarditis are incomplete and to a certain extent incorrect. A considerable number of patients and of specimens has been studied during the past three years in order to arrive at a better understanding of the disease. We have two points to emphasize in presenting this material: first, that patients suffering from subacute bacterial endocarditis may recover, and second, that subacute bacterial endocarditis may be present with little or no clinical evidence for its existence. Before entering upon a discussion of these points, we wish to present the following simple classification of infectious, non-syphilitic endocarditis:

1.) Acute bacterial endocarditis (ulcerative or malignant endocarditis).

a) Primary

b) Secondary to an infectious process elsewhere in the body.

2.) Subacute bacterial endocarditis.

3.) Rheumatic endocarditis.

a) Acute

b) Chronic, recurrent or healed.

As an example of the first group we can describe a patient who entered the hospital complaining of stiff and aching joints. He had an occasional shaking chill and a marked daily fluctuation of temperature. The pulse was rapid and of poor quality. A loud rasping systolic murmur was heard at the apex. Hemorrhagic spots appeared in the conjunctivae, fingers and toes. The patient died after an illness of a few days. The autopsy shows a heart of normal size with no evidence of thickening of the endocardium, valves or chordae tendinae. There is a soft, brown, ragged mass of friable material on the mitral valve which overlies an area of destruction and ulceration of valve substance. Infarcts of spleen and kidney are present and the blood cultures show a pure growth of a hemolytic streptococcus.

As an example of secondary bacterial endocarditis is a patient with an acute osteomyelitis. He suffers from repeated chills and the temperature shows a marked daily variation. Petechiae and changing cardiac signs develop. The blood culture reveals the same organism as that grown from the osteomyelitis. The course of the disease is a quickly fatal one. At autopsy the heart may be grossly undistinguishable from that of the previous case. No evidence of a chronic or healed inflammatory lesion is found. An acute, ulcerative process, with large soft vegetations, is present on the valves.

The patient with subacute bacterial endocarditis often gives a history of chronic valvular disease. For some time he has been losing strength and energy. A mild degree of intermittent fever is present and there may be some change in color of the skin. Petechiae appear. There is a marked anemia, the spleen enlarges, and evidence of acute glomerulonephritis may be present. The blood culture would be expected to show a growth of streptococcus viridans. The duration of life in such a case ranges from six months to two years. The heart when examined at autopsy may, or may not, show evidence of a previous inflammatory condition, such as, thickened chordae tendineae, endocardium and valves. Irregularly distributed over the valves, chordae and endocardium are rather small, soft, granular vegetations, which tend to clump together to form an irregular mat of brown friable material. There is a well marked tendency to destruction and ulceration of the tissues underlying the vegetations.

The diagnosis of rheumatic fever is justified if a patient with a history of repeated joint involvement shows evidence of valvular, myocardial or pericardial damage. Such a patient may live for many years in relative bodily comfort, depending upon the efficiency of the myocardium. Blood culture shows no growth as a rule. The heart is often larger than normal. The endocardium shows thickening. The valves may be distorted with partial fusion and retraction of the cusps. Evidence of old or fresh adhesive pericarditis is often observed.

Of these three groups of infectious, non-syphilitic endocarditis the malignant and rheumatic

*For records and addresses of authors see "This Week's Issue," page 102.

types have long been recognized. Subacute bacterial endocarditis was established as an entity mainly through the efforts of Osler, Schottmüller and Libman. Although this condition has been much discussed in recent years, it is felt that certain aspects of the disease should receive additional emphasis.

The evidence for the statement that patients with subacute bacterial endocarditis may recover has hitherto been the fact that such patients with a typical clinical picture and a positive blood culture do survive and become symptom and bacteria free. The possibility of obtaining postmortem examinations is but slight, and such examinations, as far as we can ascertain, have not been reported. It was thought desirable, therefore, to examine a series of hearts, obtained postmortem, to determine whether or not morphological changes were present which would suggest a healing or healed subacute bacterial endocarditis. Several cases were found which showed processes ranging from partial to complete healing.

The endocardium of the auricle, and often of the ventricle, was thickened and white. Firm, granular, brown masses of organized or calcified vegetations were scattered frequently over the endocardium, valves and chordae. The valves were thickened, shortened and retracted. Deep ulcerated areas filled with calcified vegetations were present in the valve. The chordae tendineae were shortened and thickened. Many had been ulcerated and broken, with eventual healing and fibrosis. Hearts showing such a healed ulcerative process were also found with superimposed, incompletely healed, and quite fresh vegetations. A heart with a destructive, ulcerative process of valves, endocardium or chordae, in which the lesions have undergone fibrosis and calcification, can only be interpreted as a case of partly or completely healed subacute bacterial endocarditis. A necrosing, ulcerating process is completely foreign to the pathological picture of rheumatic fever.

That subacute bacterial endocarditis may exist without clinical evidence for it is proved by the number of cases found at postmortem which had not been suspected during life. The diagnosis of the typical case is not difficult; nevertheless the differentiation of the atypical one from rheumatic fever is not easy. When evidence of bacteremia is present, as shown by embolic phenomena, the possibility of rheumatic fever may be eliminated. Similarly, if there is evidence of pericarditis, the case is unlikely to be one of subacute bacterial endocarditis. Considerable difficulty arises from the clinical features common to both diseases. Painful joints are common in both, being found in fully half the cases of subacute bacterial endocarditis. Cases have come to autopsy with a diagnosis of rheumatic fever which revealed the typical lesions of sub-

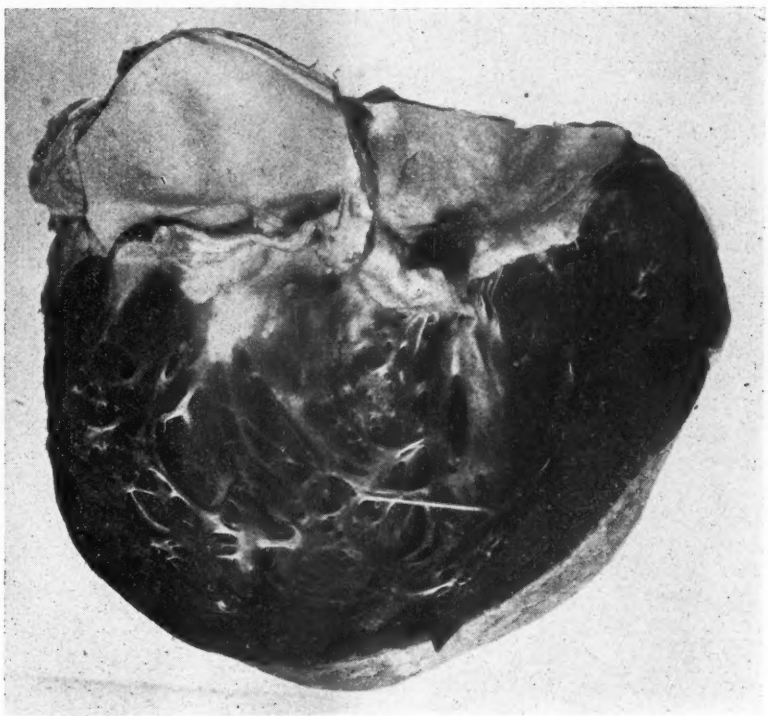


FIG. 1. Autopsy Number 27-68.
S. C., aged 25. History of rheumatic fever obtained. For ten years patient had been suffering from symptoms and signs of cardiac disease. No fever observed.
Blood cultures yielded no growth.
The superior surface of the fused mitral valve presents a deep ulceration, 1 cm. in diameter, with a rough granular floor and edge. Around this area a number of small masses composed of irregular patches, each about 1 mm. in diameter, are present. The lesions are stony hard and white.

acute bacterial endocarditis. An increasing number of blood cultures, positive for *Streptococcus viridans* and anhemolytic streptococci, is reported in cases called clinically rheumatic fever. These organism have been and are considered by a number of investigators as etiological agents in rheumatic fever. Animal experimentation with such organisms, however, has failed to produce lesions similar to those found in rheumatic fever in the human. Similarly, therapeutic efforts with antisera for *Streptococcus viridans* have failed to benefit cases of rheumatic fever. As the green producing and anhemolytic streptococci have not been proved to be the cause of rheumatic fever, it seems justifiable to accept the belief that, when such organisms are cultured from the blood in a case which is clinically rheumatic fever, subacute bacterial endocarditis is probably present, as a result of a secondary bacterial invasion. Because positive cultures are sometimes found when the focus is elsewhere than the heart valves, it is essential for the establishment of a diagnosis of subacute bacterial endocarditis that evidence be present to show that the source of the organisms is in the heart.

To show how completely silent the disease of subacute bacterial endocarditis may be we can quote two cases from the records of the medical examiner. These were young men, apparently in perfect health, who died by violence. The classical pathological picture of subacute bacterial endocarditis was found in the hearts.

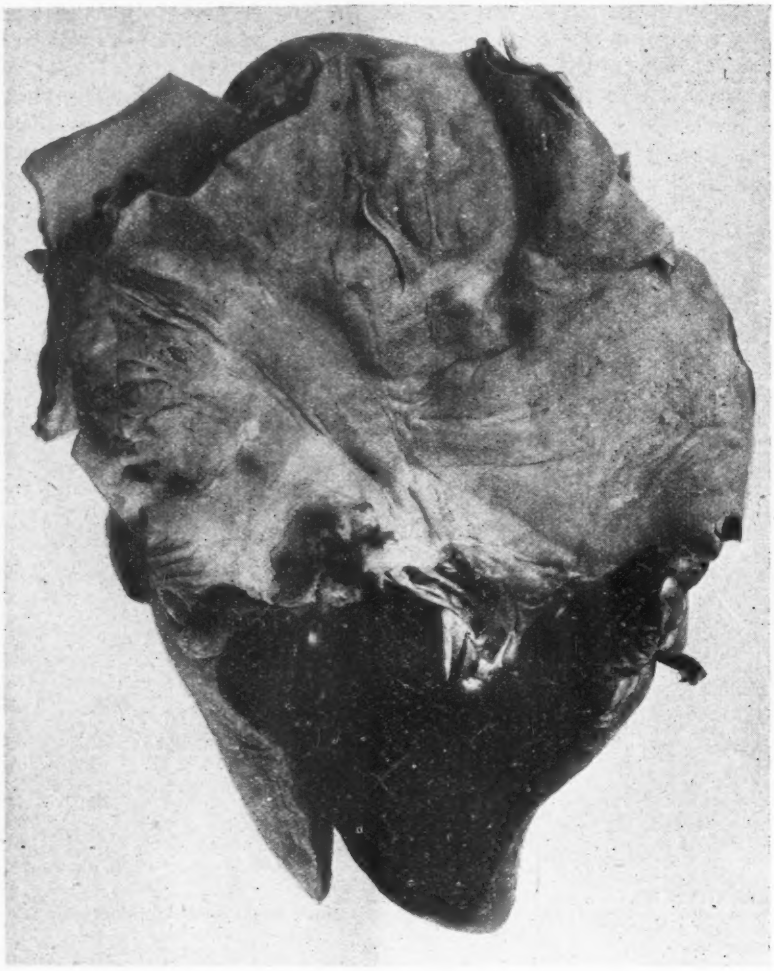


FIG. 2. Autopsy Number 27-133.

W. A., aged 44. History of rheumatic fever not obtained. Symptoms and signs of circulatory failure noted for one year. No fever or other signs characteristic of subacute bacterial endocarditis observed during his stay in the hospital. Cultures of the blood obtained from the heart postmortem showed no bacterial growth.

The mitral valve is thickened. On the upper surface of the aortic cusp of the mitral valve there is an irregular, granular, ulcerated mass about 1.5 cm. in diameter. The consistency of this lesion varies from stony hard to quite soft and friable. Under the mitral valve a number of white masses, firmly adherent to the endocardium, about 1 to 2 cm. in diameter, are noted. On the cusps of the aortic valve similar masses are located.

The occasional observation of clubbing and an elongation of the fingers long before the appearance of characteristic symptoms and signs of subacute bacterial endocarditis, is also suggestive that changes in the circulation and the cardiac function may occur before the clinical picture of the disease is observed.

From the foregoing discussion it may be concluded that subacute bacterial endocarditis is probably more common than it has been consid-

ered in the past. Libman in a recent article called attention to the so-called mild cases of the disease. Such patients show positive blood cultures at one time or another without other manifestations of subacute bacterial endocarditis, in the older sense of the term. Such a mild infection may occur with or without clinical signs of valvular disease. The temperature may be normal or slightly elevated. Color changes in the skin and anemia are slight or absent. Embolic phenomena are not present. Enlargement of the spleen and nephritis are often not apparent. Libman reports a mild case which, during two years of observation, showed repeatedly positive blood cultures with but few clinical symptoms and signs, and expresses a suspicion that such cases may be frequent. All such mild cases recovered or are still under observation.

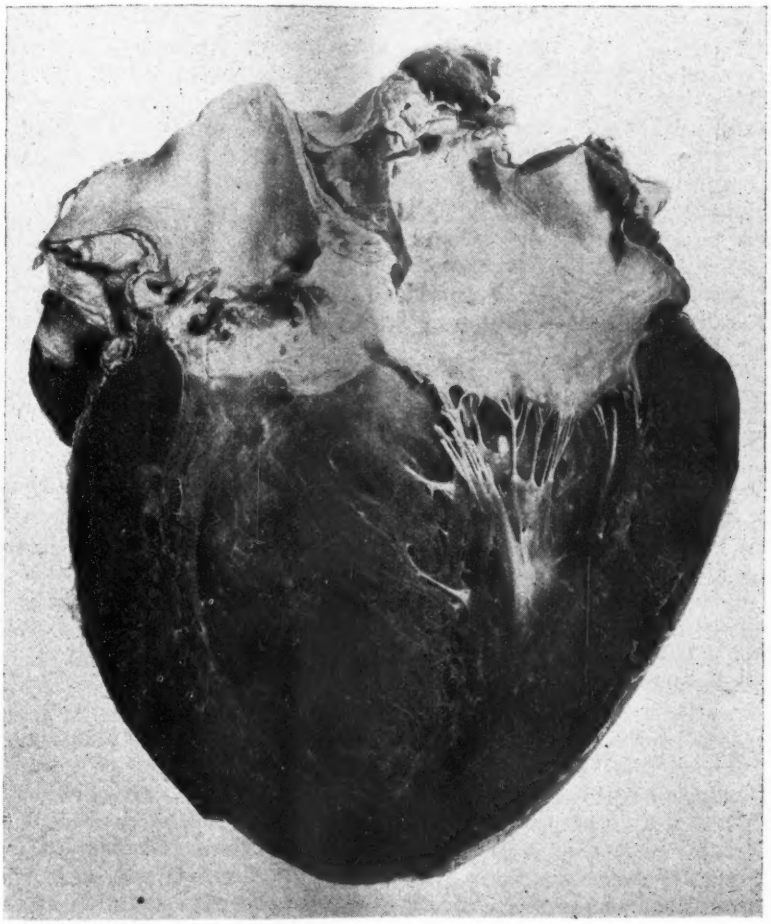


FIG. 3. Autopsy Number 27-85.
A. K., aged 33. History of rheumatic fever not obtained. Symptoms and signs of cardiac failure observed for three months. During his stay in the hospital characteristic symptoms and signs of subacute bacterial endocarditis were not observed. Cultures of the blood obtained from the heart postmortem yielded no bacterial growth.
The aortic valve is markedly stenosed. There are numerous vegetations on the cusps. Some of them are stony hard, others of firm consistency. The aortic arch is uninvolved.

Our intention was to obtain a composite picture of the clinical and morphological changes brought about by the disease. Such a correlation may be classified as follows:

a) Patients with a classical clinical picture of subacute bacterial endocarditis, with a blood culture positive for *Streptococcus viridans* and with typical soft vegetations over the valves and endocardium.

b) Patients with the clinical picture of subacute bacterial endocarditis and with a positive blood culture and characteristic vegetations, who show old fibrosed and calcified ulcerative lesions as well.

c) Patients with no clinical manifestations of subacute bacterial endocarditis, but with evidence of chronic valvular disease, with occasional fever and with marked fluctuation of the circulatory efficiency without obvious cause. There was often a history of rheumatic fever. No bacteriological studies were made during life. The hearts of such patients show chronically distorted valves with healed, calcified and organized ulcerations. Fresh friable vegetations are superimposed on the healed lesions.

d) Patients with or without a history of chronic valvular disease and rheumatic fever. The valves are chronically distorted with fusions of the cusps and organized, calcified vegetations. Two of the cases in which death was sudden,

showed bicuspid aortic valves with calcified vegetations. Postmortem cultures were negative.

The photographs demonstrate the gross postmortem appearance of the hearts of three patients, as examples of completely healed vegetations and ulcerations of the endocardium.

We attach significance to the observation that patients who clinically were typical cases of subacute bacterial endocarditis showed in the hearts healed ulcerative lesions with calcified vegetations, in addition to fresh vegetative processes. We also feel that it is important that hearts were observed with healed ulcerative lesions of the valves and fused aortic cusps from patients who gave no history or clinical evidence of subacute bacterial endocarditis.

These clinical and pathologic observations, together with the findings of Libman and those of Lewis and Grant, support our belief that the manifestations of subacute bacterial endocarditis may be quite variable. The patient may show a severe septicemia with generalized toxic and embolic manifestations, or may have complete absence of symptoms and signs with pathologic evidence of complete healing. It is probable that the well recognized form of the disease with toxic and embolic manifestations represents only one group of patients suffering from the disease. This form may result either from an overwhelming invasion of *Streptococcus viridans,* or may be the end picture of a chronicity of years duration. The clinical course of the patients and the specimens examined suggest that subacute bacterial endocarditis may be of a chronic nature with a continuous and variable attempt at healing by the body. These observations indicate that chronic valvular disease may result from healing or healed bacterial endocarditis, and that the prognosis in this disease may vary greatly with the patient. The diagnosis of mild cases of subacute bacterial endocarditis may be very difficult. Whenever a patient with chronic valvular disease of unknown etiology shows sudden circulatory failure without obvious cause, subacute bacterial endocarditis should be suspected and repeated efforts made to confirm this suspicion by bacteriological studies.

KETOGENIC DIET IN THE TREATMENT OF EPILEPSY

BY WILLIAM G. LENNOX, M.D.*

ONE who is confronted with the task of controlling seizures in a person with epilepsy grasps at any straw. When, some six or eight years ago, an osteopathic practitioner in Michigan stated that fasting would cure epilepsy, this seemed like a very frail straw. Dr. Geyelin, at the Presbyterian Hospital in New York, took up the matter, however, and found that in many patients there was freedom from seizures during fast. Others have since confirmed this observation. Geyelin suggested that the beneficial effect might be from the acidosis which is present during fasting and that more satisfactory results might be obtained from the use of a high fat, low carbohydrate diet. Various workers have corroborated the truth of this suggestion. There are various interesting questions which these observations raise, some of which we feel can be answered.

Is the beneficial effect due to correction of an underlying abnormality of acid-base equilibrium in epileptics? We believe that this is not the case, but that the salutary effect of acidosis is due to a decrease in the irritability of the nerves. Acidosis relieves conditions other than epilepsy, such as muscular cramp, hiccough or tetany. Furthermore, the blood of patients with epilepsy shows the normal degree of alkalinity.

Is the beneficial effect of ketosis due to the acidosis or to a specific sedative effect of acetoacetic acid, which is related to ether? We believe that acidosis is the significant factor. This is based on the fact that seizures may be reduced also by other methods of inducing acidosis; viz., the ingestion of acid or acid-forming salts or by breathing a mixture high in CO_2. Patients who are on a ketogenic diet, if given bicarbonate, will show an increase in the ketone bodies with, oftentimes, a coincident increase in seizures. Besides the administration of bicarbonate, overventilation may induce seizures.

A third question is whether ketogenic diet is effective only in patients with so-called essential epilepsy. If what we have said concerning the first question is true, we would expect that patients subject to convulsions from a definite cause, such as a brain lesion, would be improved as well as those who show no evidence of abnormality, the so-called idiopathic epileptics. In our experience, patients with traumatic epilepsy may be helped by induction of acidosis.

Again one may ask, what degree of ketosis is needed to prevent seizures? This depends upon the severity of the case. In mild cases, the presence of a positive ferric chloride or sodium nitroprusside test in the urine may be sufficient. In severe cases, a change in the *p*H of the blood may be necessary. The comparatively good results obtained in children are partially due to the fact that ketosis is more readily maintained in children than in adults.

These various statements may be illustrated in two patients whom we now have under treatment. The first is a girl of 13 years, who, for the last 4 years, has been having 10 to 15 attacks of petit mal daily. She has never had a convulsion. These attacks are not observable to an onlooker. They are the type termed pyknolepsy and are not influenced by luminal or bromide. With six days of fasting the spells disappeared. Follow-

*For record and address of author see "This Week's Issue," page 102.

ing this she was placed on a high fat diet with a constant ketogenic, anti-ketogenic ratio. On this diet she had a strong sodium nitro-prusside test in the urine, a normal blood CO_2 content and 5 to 10 spells daily. With ingestion of ammonium chloride, the spells disappeared entirely. They recurred when the patient was given bicarbonate and disappeared again when she was given ammonium nitrate. A typical spell can be induced in this child with about two minutes over-ventilation.

The second patient illustrates an entirely different condition. He is an intelligent boy of seven years, the first born. His mother had a prolonged and difficult labor and the child had three convulsions when three days old. In the intervening years he has had seizures only periodically. During the last five months he has had increasing seizures so that for several weeks previous to his entrance he was having from three to six a day. In some of these attacks he simply fell headlong without convulsive movements. In others he did not fall, but his right arm jerked and was paralyzed for a few minutes after the attack. Following lumbar puncture and drainage of the spinal canal, these Jacksonian-like attacks did not occur for several weeks. In this child there would seem to be definite evidence of intracranial damage at birth with present pathology over the right arm area of the cortex, perhaps an area of arachnoiditis and cyst formation. On a high fat diet this patient lost his seizures and has had none for the past week. The curious feature of his ketosis is that, although there is a strong sodium nitro-prusside reaction in urine and blood, the concentration of bicarbonate in plasma is normal and his urine is strongly alkaline.

These cases demonstrate that, in young persons, the induction of acidosis, by means of fat diet, supplemented, if need be, by ingestion of acid-forming salts, is effective, temporarily at least in inhibiting epileptic seizures.

Demonstration of Thyroid Cases. Cases presented and discussed by Dr. Robert Cochrane.

The Problem of a Patient in whom an Instrumental Delivery Has Been Attempted without Success. Case discussed by Dr. Frederick J. Lynch.

Use of X-ray as an Aid in Obstetric Diagnosis. Cases presented and discussed by Drs. Nathaniel R. Mason and Pierce J. Dunphy.

Case of Perinephritic Abscess (Left) and Nephrotomy (Right) for Drainage of Blocked Ureter. Case presented and discussed by Dr. Augustus Riley.

Pain in Back for Ten Years. Case presented and discussed by Dr. Thomas K. Richards.

At the Staff Clinical Meeting held January 28, 1928, papers were read as follows:

Bullet Wound of Abdomen with Septicemia. Case presented and discussed by Dr. Edward Harding.

Compound Fracture of Left Ankle with Amputation, Compound Fracture of Left Patella Into Knee Joint, Fracture of Neck of Left Femur, Compound Fracture of Both Bones of Left Forearm, Shock, and Gas Bacillus Infection in One Patient. Case presented and discussed by Dr. J. J. Hepburn.

Chronic Lymphatic Leukemia with Changing Blood Picture. Case presented and discussed by Dr. E. N. Libby. Further discussion by Drs. R. C. Larrabee and F. W. O'Brien.

Undescended Testicle. Cases presented and discussed by Dr. Halsey B. Loder.

Carcinoma of Rectum in Young Adult. Case presented and discussed by Dr. I. J. Walker.

Chronic Osteomyelitis. Fistula in Ano. Cases presented and discussed by Dr. T. W. Wickham.

Tuberculosis of the Spine Simulating Duodenal Ulcer. Case presented and discussed by Dr. R. G. Larrabee. Further discussion by Drs. F. J. Cotton and I. J. Walker.

Case of Aortic Aneurysm in which Circulation Is Maintained in Spite of Absence of Pulse in the Brachial Arteries. Cases Illustrating the Differential Diagnosis of Ascites. Cases presented and discussed by Dr. F. W. Palfrey.

THE EFFECT OF HIGH VOLTAGE, SHORT WAVE LENGTHS, ROENTGEN-RAY EXPOSURE ON THE CIRCULATING BLOOD CELLS*

BY RICHARD P. STETSON, M.D.†

IT is well known that exposure to sub-erythema doses of short wave lengths, high voltage roentgen rays decreases the number of white blood cells in the peripheral circulation. Following deep X-ray therapy, the white blood cell count of persons without fundamental disorder of the blood-forming tissues has been shown[1] to reach its lowest point usually in about six days. At that time, leucopoenia may be present and, if so, it lasts usually about nine days, but occasionally persists for as long as twelve weeks. It has also been noted that, as a rule, patients with white blood cell counts of about 10,000 per cubic millimeter before irradiation developed leucopoenia less often than did those with lower pre-treatment counts; and, further, if treatment was repeated before the total numbers of white blood cells had remained for some time at their original level, it might produce leucopoenia of greater duration than that produced after the first treatment.

The effect of roentgen-ray exposure on the skin is such as to preclude the repetition of treatment in amounts of more than 1200 electrostatic units to any one area within an interval of less than six weeks. The attention thus becomes focused on the white blood cell picture at or beyond this period, when treatment is again to be considered.

It has been customary at this hospital to count the white blood cells of patients prior to treatment by high voltage, short wave lengths X-ray irradiation. The data herewith presented have been drawn from a study of white blood cell counts made before and at intervals after such treatment on patients with some form of malignant disease exclusive of those of the blood-forming tissues. The five hundred and sixty white blood cell counts recorded in Table 1 were made on two hundred and twenty-two different patients, each having received from one to five courses of treatment. The dosage of roentgen-ray in each course varied from 1000 to 2400 electro-static units, usually administered in a series of treatments given daily, or every other day, for from two to six days. The location and the areas exposed varied with the location and extent of the malignant tumor.

Ninety-one per cent. of the patients had more than 6,000 white blood cells per cubic millimeter of blood before treatment. These figures are in striking agreement with those obtained in a much larger group of similar patients for whom there are no data subsequent to irradiation.

White blood cell counts made on patients two to four weeks after an initial course of treatment agree closely with those made in the four to eight weeks interval after therapy. These two groups are therefore considered together and are comprised of one hundred and four counts. In contrasts to counts before treatment, a significantly greater proportion of this group (twenty-six per cent. as against nine per cent.) had counts of 6,000, or less, white blood cells per cubic millimeter. Smaller groups of patients with white blood cell counts made during the same time interval following a second and third course of treatment showed no marked or consistent variation from this general trend.

Beyond the eight weeks interval after treatment, the proportion of patients showing more than 6,000 white blood cells per cubic millimeter again rises to approach, but not quite regain, the average pre-treatment level. It is of interest to observe that there is a higher percentage of counts above 6000 white blood cells per cubic millimeter during the time interval of eight to twelve weeks after treatment than subsequently. Whether or not this is due to an effort on the part of the depressed bone marrow to regain its normal delivery of circulating white blood cells, followed by a stabilized production at a level slightly below normal cannot be determined from the available data. The statistics presented in Figure 1 are compiled from all of the white blood cell counts (560), and might be considered to indicate some such process

Forty-one of the patients receiving more than one course of treatment had their second course less than twelve weeks after the initial treatment. Only five of these patients had their white blood cells counted two to four weeks after the second course of treatment, but of these, four showed less than 6,000 per cubic millimeter. The figures obtained from twenty-six counts made in the four to eight, and eight to twelve weeks interval after the second course of therapy are in essential agreement with those obtained in like periods of time after the first course of treatment. The fact that the counts of six of thirteen patients taken more than twelve weeks after a second course showed 6,000 or less white blood cells per cubic millimeter might suggest a more prolonged depression after a second, than after a first, course of treatment with high voltage X-rays in therapeutic doses. This, however, cannot be deduced because none of five patients who received three courses of treatment, less than twelve weeks apart, showed a leucopoenia after the third course of treatment. The

*From the Medical Service of the Collis P. Huntington Memorial Hospital of Harvard University. This work was aided by a grant from the Proctor Fund of the Medical School of Harvard University for the study of chronic disease.

†For record and address of author see "This Week's Issue," page 102.

TABLE 1

Analysis of 560 White Blood Cell Counts on 222 Patients Before and at Intervals After Exposure to High Voltage Roentgen-ray Therapy

Time at which counts were taken	White Blood Cells per cu. mm.									
	Less than 5000		Between 5000 and 6000		More than 6000					
1. Before exposure (212 counts)	Number of Counts 2	Per Cent. 1	Number of Counts 16	Per Cent. 8	Number of Counts 194	Per Cent. 91				
	First Treatment (222 Cases)		Second Treatment (70 Cases)		Third Treatment (17 Cases)		Fourth Treatment (4 Cases)		All Cases (348 Counts-222 Cases)	
	Number Counts	Per Cent.	Number Counts	Per Cent.	Number Counts	Per Cent.	Number Counts	Per Cent.	Number Counts	Per Cent.
2. 2 to 8 weeks after exposure										
Less than 5000 WBC/cu.mm.	13	13	2	8	0	0	0	0	15	11
Between 5000-6000 WBC/cu.mm.	14	13	6	22	2	29	1	100	23	17
More than 6000 WBC/cu.mm.	77	74	19	70	5	71	0	0	101	72
3. 8 to 12 weeks after exposure										
Less than 5000 WBC/cu.mm.	3	5	0	0	0	0	1	50	4	5
Between 5000-6000 WBC/cu.mm.	4	7	3	17	0	0	0	0	7	8
More than 6000 WBC/cu.mm.	53	88	14	83	6	100	1	50	76	87
4. 12 to 24 weeks after exposure										
Less than 5000 WBC/cu.mm.	0	0	3	12	0	0	0	0	3	3
Between 5000-6000 WBC/cu.mm.	10	16	4	17	1	17	0	0	15	16
More than 6000 WBC/cu.mm.	51	84	17	71	5	83	1	100	74	81
5. More than 24 weeks after exposure										
Less than 5000 WBC/cu.mm.	0	0	0	0	0	0	0	0	0	0
Between 5000-6000 WBC/cu.mm.	4	20	1	11	0	0	0	0	5	17
More than 6000 WBC/cu.mm.	16	80	8	89	1	100	0	0	25	83

same is true for five other patients treated so that there was less than a twelve weeks interval between the second and third series of exposures, but a longer interval between the first and second courses of roentgen-ray therapy. These observations offer opportunities for speculations concerning the development of a resistance by the bone marrow when subjected to repeated roentgen-ray exposure.

In an attempt to discover possible factors in the production of post-irradiation leucopoenia, twenty-eight cases were selected at random from those showing more than 6,000 white blood cells per cubic millimeter six weeks after roentgen-ray treatment for comparison with an equal

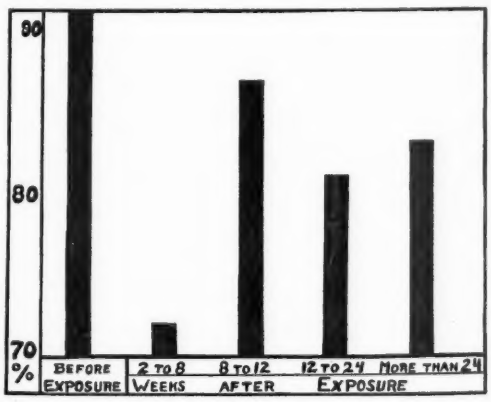


FIGURE 1.

Percentage incidence of white blood cell counts above 6000 cells per cu. mm. before and at intervals after exposure to high voltage Roentgen-rays.

number of cases with 6,000 or less white blood cells per cubic millimeter at the same time interval after exposure. The nature of the malignant tumor, previous treatment by radium or X-rays in minor amounts, the location of the exposure, the area exposed, the dosage employed within the usual therapeutic limits (1000 to 2400 E. S. U.), and the proximity of a fatal exodus were not sufficiently different in these two groups to warrant conclusions. The data are given in Table 2.

It is perhaps noteworthy that both the average dosage employed and the average area exposed were slightly greater in the group with the lower white blood cell counts following irradiation; and that, conversely, the mortality was slightly greater and more prompt in the group taken for comparison. A more apparent point of difference lies in the pre-treatment level of circulating white blood cells. In the group developing a low white blood cell level after exposure, the pretreatment counts averaged 8,000 per cubic millimeter as contrasted with an average of 10,000 per cubic millimeter shown by the group not falling below 6,000 white blood cells per cubic millimeter six weeks after exposure. The fall in white blood cells after exposure in the group developing leucopoenia averaged thirty-six per cent., that in the non-leucopoenic group averaged but thirteen per cent. In absolute numbers, the average fall in white blood cells per cubic millimeter of circulating blood was more than twice as great in the leucopoenic group (2,900 cells per cubic millimeter) as in the non-leucopoenic group (1,300 cells per cubic millimeter).

CONCLUSIONS

1. High voltage, short wave lengths roentgen-ray exposure in doses of between 1000 and 2400 electro-static units produces a marked

TABLE 2

Data Concerning 28 Cases of Malignant Disease, Chiefly Cancer, with Leucopoenia, and 28 Similar Cases without Leucopoenia, 6 Weeks after High Voltage Roentgen-ray Therapy.

	(1) Dosage Electro-Static Units	(1) Area Exposed Square Centimeters	Location Exposed						Time of death after therapy
			Chest	Neck	Pelvis	Abdomen	Hip	Head	
With 6000 or less WBC/cu.mm.	1957	355	14	6	5	2	1	0	(2) 11 mos.
With more than 6000 WBC/cu.mm.	1937	348	14	8	4	1	0	1	(3) 7 mos.

(1) Averaged (2) Average of 9 fatal cases (3) Average of 14 fatal cases

transitory and a slight prolonged depression of the bone marrow as is evidenced by a decrease in the number of white blood cells in the peripheral circulation.

2. This depression is probably never severe enough in cases without a primary disease of the hemopoetic tissues to preclude the repetition of roentgen-ray treatment when general indications make this advisable after a four to six weeks interval.

3. Patients with 8,000 or more white blood cells per cubic millimeter before roentgen-ray exposure are less likely to develop leucopoenia afterwards than patients with a lower white blood cell level.

Note: I wish to acknowledge the kindness of Dr. George R. Minot for his suggestions and criticisms in the preparation of this paper, and the assistance of Miss Geneva A. Daland in gathering the data presented.

REFERENCE

1 Minot, G. R., and Spurling, R. G.: Effect on the Blood of Irradiation, Especially Short Wave Length Roentgen-ray Therapy. Am. J. Med. Sc., 168:215-241, (Aug.) 1924.

ROTARO-LATERAL CURVATURE OF THE SPINE SECONDARY TO HYPERTROPHY OF THE HEART*

BY HAROLD G. LEE, M.D.†

ROTARO-LATERAL curvature is a very common problem in the field of orthopedic surgery, and, although the causative factors are fairly well accepted, the influence of heart hypertrophy has not been generally appreciated.

Hypertrophy of the heart is an enlargement due either to a general condition, to extra work, or to a special condition, to combat a deficiency of cardiac structure such as damaged valves.[1] The combination of these lesions is reported, since a search of the literature failed to reveal a report of an enlarged heart being considered the causative factor in rotaro-lateral curvature of the spine. This case also demonstrates the fact that a badly damaged heart is compatible with life when its activities are reduced to a minimum.

M. I. Age 14. Seen in consultation with Dr. A. W. Hopkins of East Swanzey, at Elliot Community Hospital, Keene, N. H. The problem was one of increasing spine deformity.

The child was perfectly normal until two years and nine months of age, when, following an attack of grippe, she developed swelling of the feet and shortness of breath. She was admitted to the Children's Hospital, Boston. A résumé of the record of the Children's Hospital follows:—

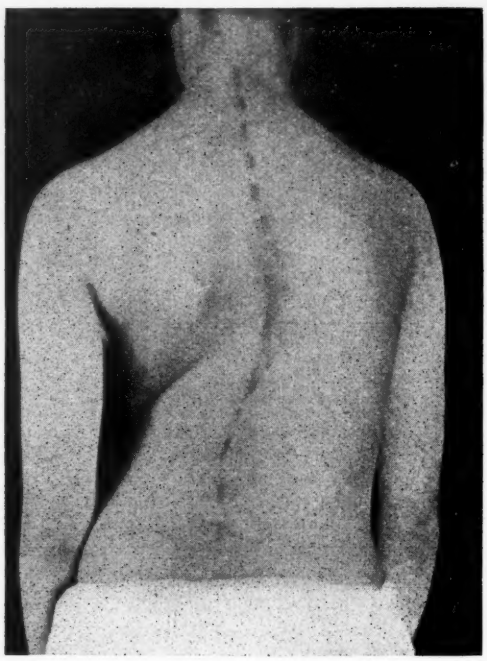
"Child was seen at the age of two years and nine months in September, 1914. Gave a history of grippe in March 1914. About April first noticed shortness of breathing, slight swelling of feet. No worse at time of admission than in July when feet and ankles became swollen. Heart 2 3/4 x 9 cm. Apex beat palpable in 6th space anterior axillary line. Presystolic thrill palpable in 4th and 5th interspaces. First apex sharp and accentuated followed by loud blowing systolic murmur, transmitted all over precordia and into axilla and back. P_2 greater than A_2.

"Through the child's stay edema, cyanosis, and dyspnea increased. Heart action became more rapid (150) until September 27th when conditions improved a little.

"Discharged on November 1st when edema was somewhat less and patient had slept better. Cyanosis and shortness of breath persisted.

"Diagnosis: Chronic Endocarditis, Stenosis, and Regurgitation."

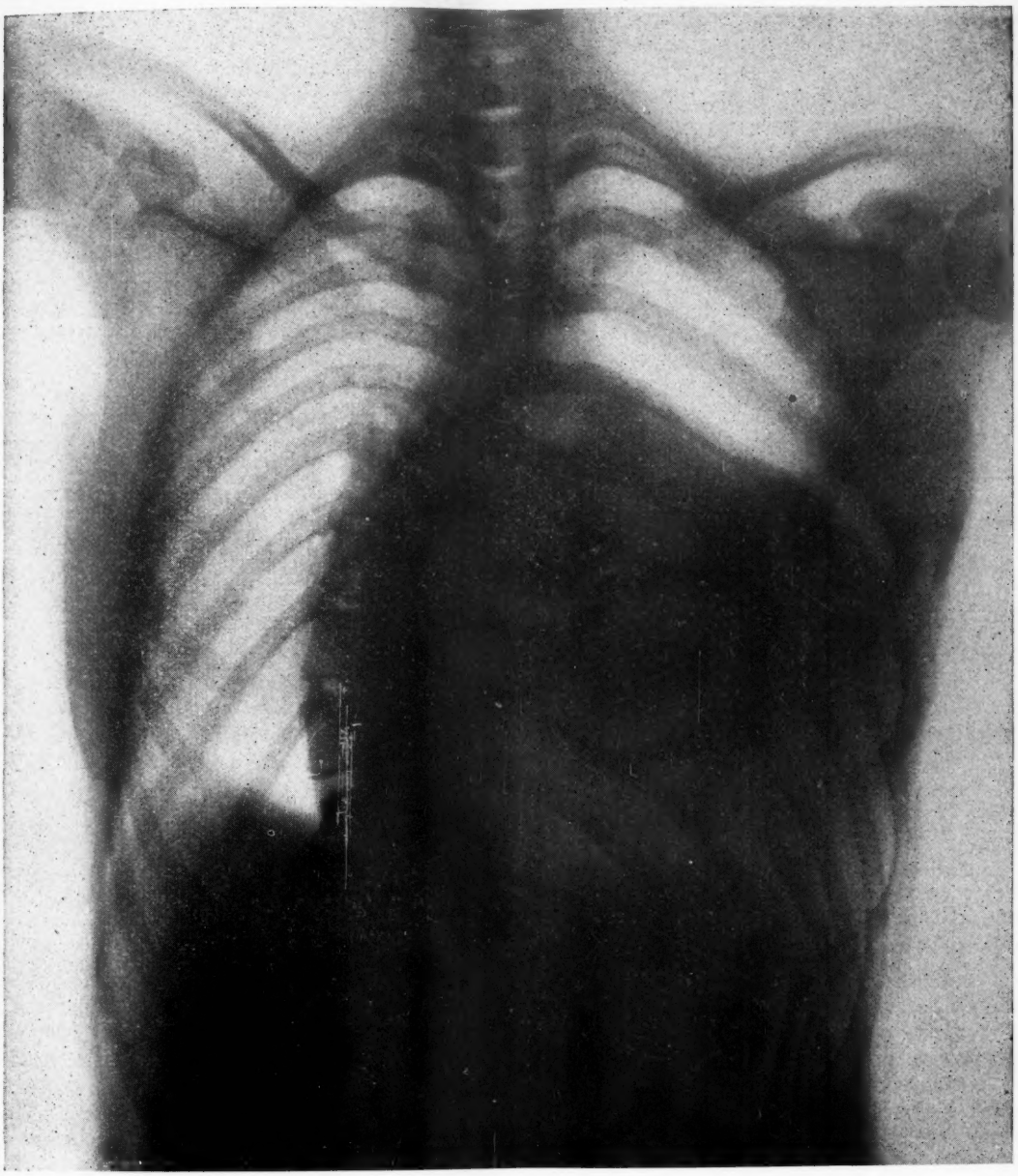
At the time of discharge from the hospital, the mother was told that the child could not possibly live. She has, however, gone through practically all the diseases of childhood, although with the greatest difficulty. At no time has she been able to stand or walk without assistance, and following the slightest exertion or illness she has been continuously in bed for periods varying from a few weeks to three years.



The *deformity of the spine* was first noticed about four years ago and seems to be steadily increasing. The customary appearance of a right dorsal, left lumbar curve was noted. The dorsal curve was seen to be acutely angulated with a lateral deviation of about one and one-half inches with considerable rotation. The rotation was structural in character although with force some correction could be obtained. The photograph shows the maximum deviation of the dorsal curve, not unlike the ordinary type of scoliotic spine. The radiogram shows the spinal

*From the MacAusland Orthopedic Clinics.

†For record and address of author see "This Week's Issue," page 102.



curve with the greatly enlarged heart conforming to the concavity of the dorsal curve.

Inasmuch as the early predisposing factors usually associated with rotaro-lateral curvature have been absent, the extreme enlargement of the heart was considered the etiological factor in the scoliosis.

REFERENCE

1 Osler and McCrae, 9th edition.

THE PROBLEM OF STERILITY

BY JOHN ROCK, M.D., F.A.C.S.*

WHATEVER may be the spiritual purpose in man's existence, there can be little doubt that his physical end, like that of all other species of animal and vegetable life, is to perpetuate his kind. The normal man or woman is endowed with an instinctive desire for offspring; the permanency of the state depends on the replacement of its citizens; and the proper utilization of a country's resources to support the largest effective number of individuals is essential to its autonomy among the nations of the world. For these reasons the ability of the individual man or woman to bear and rear healthy children is of prime importance. We are not here concerned with the lamentable unwillingness of sound husbands and wives to use their ability, but only with those factors which defeat married men and women desirous of justifying

*For record and address of author see "This Week's Issue," page 102.

alike their human existence and their marriage.

The number of couples thus baffled is larger than most people realize, though it is of course impossible to state how large. Statistics vary according to the incidence of certain contributory factors not directly biological at all, such as, social status, political security, economic conditions, and moral soundness. Kisch gives the results of many investigations, which, taken together, indicate a general average of about 12%. He considers a marriage sterile after three years of marital intercourse. Reynolds and Macomber, (without giving a time limit for the demonstration of fertility) write: "In conclusion and in review of all the evidence obtainable, it is evident that we have as yet no exact knowledge of the frequency of sterility in human marriages; but . . . there is a general consensus of opinion that an estimate of approximately 10% of involuntary sterility is the nearest approach to the truth at which we can arrive". Dublin, chief statistician of the Metropolitan Life Insurance Company, says:—"At the present time, about one marriage in six is either sterile or does not lead to live issue",—a sterility of almost 17%. The seriousness of this problem in certain classes, and to doctors engaged in its solution, is brought out by the tables of Phillips, which compare the fertility of marriages of men who graduated from Harvard College in the classes of 1851 to 1860, with that of men graduating from 1891 to 1900. Of the marriages of antebellum graduates, there were 15% without issue; but 25% of the marriages of the classes of 1891 to 1900 were sterile. I think it is fair to assume that very little of this sterility is voluntary.

The figures of Dr. Phillips, of course, are for marriages, not individuals, and do not at all indicate the amount of male defect in modern sterile matings. All factors which diminish fertility are not sex limited, so the absence of progeny can well be due to trouble in either or both partners, or in their relations to each other.

Reynolds and Macomber, by excellent experimentation on rats, explained many failures in human matings. They demonstrate that the fertility of any union depends not on the absolute but on the relative fertility of each partner; that the partial defects of one partner must be supplemented by excellencies in the other, if the union is to be productive. This principle they express mathematically. The effectiveness of a mating equals the fertility value of the male times the fertility value of the female. The actual values for humans are obviously not discoverable; but for laboratory animals, and even barnyard stock, among which individuals can be mated over and over again with many different partners, it is possible to express in arbitrary numbers an index of fertility for each individual. When this figure is determined, it is possible to prophesy quite accurately the results of any given mating. If the product of the indices of the two mated individuals is equal to or greater than the threshold index of fertility for that species, there will be offspring. If the product of the individual indices is less than the threshold index, there is sterility, however high may be the fertility value of either partner.

This law of Reynolds and Macomber, that the index of fertility of a mating equals the product of the indices of fertility of the partners, has great practical significance. When confronted with a sterile marriage, the doctor is not concerned with the proved ability of either partner to have children with another husband or wife. He must determine the exact condition of each partner, and then by improving wherever possible each factor in each mate, try to bring either the husband or wife up to such a standard that he or she will be able to supplement the stubborn, persistent defects in the other member. This makes of the practice of sterility a combination of gynecology, genito-urology and internal medicine.

Before discussing the manifold factors which diminish fertility, let us briefly review the normal process of human reproduction. In a not inconsequential way, of course, every somatic and psychic function of the human being subserves the purpose to which the so-called sexual organs directly devote themselves. We confine our attention merely to the latter, not forgetting, however, that, if these fail in their purpose, the fundamental cause may be secretly reposing in some distant and silent unit of the organism.

Spermatozoa with enough fluid to serve as a vehicle are formed by successive cell division in the walls of the tubules of the testicle. From these tubules they are constantly displaced, by their successors, into the convolutions of the epididymes and thence into the long vasa deferentia. In this system of ducts they accumulate until the very beginning of orgasm, a phenomenon which consists in a series of convulsive contractions of the whole genital canal. To quote from Marshall, these "probably begin in the walls of the vasa efferentia and pass to the canal of the epididymis, and thence along the vas deferens on either side. The vesiculae seminalis contract simultaneously, expelling their contents into the vasa, and the fluid passes out through the ejaculatory ducts into the prostatic portion of the urethra. The prostatic muscles also contract, and probably assist in forcing the semen along the urethra, while at the same time expelling the secretions of the prostate glands." "The final discharge is brought about by the rhythmical contraction of the bulbo-cavernosus and ischio-cavernosus muscles, which have the effect of emptying the canal from behind forwards, and so ejecting the semen, mixed with the various glandular secretions, into the vaginal passage of the female."

Authorities differ as to the details of further progress. The spermatazoa, once they are thoroughly bathed in the alkaline fluid from the prostate and vesicles are thoroughly lively in-

dividuals with a remarkable determination to find their way to the rendezvous with the egg. That they do this in spite of great obstacles, we shall see later. Normally those spermatozoa destined to reach the finals in the struggle are deposited, if not directly in the external os, as some maintain, at least in close approximation to it. They then find their way in constantly diminishing numbers through the mucus of the cervix, past the internal os, and through the uterus into the tubes. In one or the other of these, the successful spermatozoon meets an egg and fertilization takes place.

The genesis and progress of the ovum to this meeting is less involved. The ova are laid down in definite numbers each inside a Graafian follicle, collections of which arise from the original embryonic entoderm. These form the so-called germinal epithelium, which, as connective tissue and vessels and nerves grow into it, becomes the ovary. In individual follicles, the eggs remain quiescent until puberty. With the onset of sexual maturity one by one, probably each month, an egg ruptures through the wall of its follicle and floats from the ovary, free in the pelvic cavity. It does not get far, however, for it is quickly engulfed in the fimbriated end of the tube, which almost wraps around the ovary. In the ciliary current of the tubes, aided perhaps by peristalsis, the ovum drifts toward the uterus. Somewhere in the course of the tube, probably in the middle third, the egg is met by the spermatozoon and conception takes place. The journey to the uterus is now taken by the young embryo. It passes into the uterus, nestles into the uterine mucosa, until it is enfolded by it, when nidation is accomplished. The woman is pregnant.

Apparently essential to the perpetuation of this pregnancy during the first few months at least, is the so-called corpus luteum which has developed from the ruptured Graafian follicle. A membrane of questioned origin is formed in this torn and healed little sac: a layer of cells which are full of yellow pigment. These secrete a serous fluid which distends the wall of what has now become again a tiny cyst until it is perhaps 1 cm. or more in diameter. If the egg which came from the primary follicle is not impregnated, menstruation eventually takes place; and when this occurs, the corpus luteum begins to shrink. It finally becomes only a tiny white crinkled scar in the wall of the ovary. But if the egg from that follicle is fertilized and achieves nidation, menstruation is stayed; and the corpus luteum, instead of undergoing prompt atrophy, continues to enlarge by increased luteal secretion until it reaches, sometimes, 3 cm. in diameter. As an important endocrine organ, it remains—the protector of the growing fetus. It induces the uterus to form decidual membrane instead of menstruating, and it prevents the ovaries from ovulating. This structure is important in sterility, for occasionally it persists, even though the egg has not been fertilized. While it remains, normal menstruation does not occur; but more important still, no further ovulation takes place, and sterility is established for the time being. Reference will be made to this later.

As will be seen from this outline of physiology, there are certain essentials of fertility. In the first place there must be an enormous number of spermatozoa and a fair supply of eggs to overcome the many difficulties encountered in their conjugation. Man is hardly as handicapped as certain lower aquatic animals who must discharge their seed free in the great ocean hoping that a kind Providence will lead an egg to its midst, but he is almost as badly off. His intelligence has acquainted him with his soul, but his philosophy has not identified its interests with propagation. And so it is that the larger part of his energy is spent in the attainment of happiness by other means than the cultivation of his kind. Physical and mental adjuncts, originally intended to sustain him and make him fit for propagation, have developed an infinite assortment of gratifying interests of their own, so that in the lives of most humans, children are by-products of an active social life. Thus, the chance of any one seed being ready when the man pleases or is able to make contact with a female, is small.

Even if such contact is made, there are still many obstacles for the individual seed. Ejaculation is hit or miss, depositing much semen far away from the cervix, so that myriads of spermatozoa will perish in the vagina. Even if the individual gamete gets into the cervical canal, it still has a long journey through devious ways which it must achieve through its own motility. To make easy its way there is probably in the fluid or on the spermatozoa themselves an enzyme-like substance which dissolves the mucus plugging the cervical canal. But even with this assistance the length of the utero-tubular tract compared to the size of the spermatozoon is very great. Myriads more, then, will be worn out in the attempt to reach the tube. Then comes the small chance of such a tiny organism actually meeting an egg. To insure the presence at the moment contact can be made of at least one spermatozoon which will travel the whole distance, an enormous number are normally supplied, about 100,000,000 per cubic centimetre of semen. (Macomber.) (These may be counted as white blood cells are counted, the semen being diluted as the blood is, but with 5% sodium bicarbonate instead of acetic acid. One per cent. of formalin is added to the diluent to render the spermatozoa inactive.)

The difficulties encountered by the passive egg are much less, and the number in both ovaries at puberty has been calculated to be about 60,000. Many of these never get out of the ovary.

Besides the enormous number of spermatozoa, there is required a compatible fluid in which

they can live and be delivered to the female. Also there must be a neuromuscular mechanism for delivery. Furthermore, the canal of the female must contain a fluid through which the spermatozoa can safely find their way with vitality unimpaired. In its turn the egg must be able to break through the covering of the ovary. Once free it must be able to enter the Fallopian tube and find clear passage downward. After impregnation takes place, the new embryo must find a suitable decidual uterine lining to protect it and afford it sufficient nourishment.

Recognition of the various factors which rob the individual of these essentials of fertility is the practical problem for the physician. It is well known among farmers and among workers with laboratory animals that factors which diminish the general well-being of their animals affect first their fertility. It is undoubtedly so with humans, but harder to prove. In solving a sterility problem we must not neglect items which seem far removed from the immediate sexual sphere. An inadequate diet diminishes the fertility of both male and female. Only a few years ago a balanced ration was thought to require merely certain proportions of fats, carbohydrates and proteins, with a moderate mixture of certain inorganic salts, such as iron, phosphorus, calcium. Later we were taught that vitamins, too, must be included. The nature of these is not known, but that they are essential for adequate ovulation and spermatogenesis, as well as for the life of the embryo is quite certain. Fortunately their distribution has been discovered, at least in part. Long before the word vitamin was invented, man had realized that certain foods were good for him, and thus it is that we now find these essentials in what have already become common articles of diet. Even among primitive peoples, whose diet is limited and of a tiresome sameness, all these little vital factors are represented. It is surprising, therefore, how frequently a deficiency is discovered among peoples whose intelligence and pocket-books enable them to choose from an endless variety of edible stuff. The common omissions are of vitamin A plentiful in lettuce, kidneys, liver, cream and butter fat; and of vitamin C the antiscorbutic destroyed by cooking, so supplied to man mostly in oranges, lemons, grapefruit, and raw fleshy vegetables, such as onions and tomatoes. The mineral most essential, perhaps, and most commonly lacking is calcium, which in turn is necessary for the metabolism of phosphorus. The main sources of calcium are milk and eggs. Any partner to a sterile mating who, along with his or her assorted meats, fats and carbohydrates, does not consume at least one representative from each of the above groups every day may easily be living on a diet insufficient for normal gamete production. Very recently a new vitamin has been postulated in the laboratory—vitamin X, of Evans and Bishop, since called vitamin E, without which fertility is impossible. It has been identified in lettuce, meat, whole wheat, rolled oats and large quantities of milk fat.

Toxins, like vitamins, are known rather by their work than their nature. Indefinite chemical substances, elaborated in the body, and absorbed into the blood, cause general debility, we believe. Their presence certainly diminishes fertility; but just how is a question. Syphilis and tuberculosis may be hidden sources, but they are not so obscure as mild constipation, infected tonsils, (and in the male, infected prostate or vesicles) abscesses near the roots of teeth, pyorrhea with its collection of pus under the gum margin, and symptomless urinary infections. Any of these, and many others may supply enough noxious material to interfere with good function, even though joints do not ache, or hair fall out.

I need not here discuss the beneficial physiology of exercise, but the cant of the layman is not without scientific support: "pep" is a thing valuable for fertility. Normal sleep does something to the organism which admits its waking into new vigor—it may permit the central nervous system to be cleared of accumulated poisonous waste products. It is an essential antitoxin. The same is true of an adequate water supply. Dysfunction of the endocrine glands is another cause of faliure of productive mating. I refer not only to gross diseases of endocrine origin like cretinism, or acromegaly, but also to those minor disturbances in function which, while not destroying the individual's sense of well-being, can rob him or her of fertility. Mild hyposecretion of the thyroid and the ovary are probably most common. To assume ovarian dysfunction because a female fails in pregnancy or has atypical catamenia is quite unjustifiable, and I believe ovarian therapy, in all its variations, at least per *oram*, is still purely experimental, and perhaps as useless as testicular therapy has been. This is probably not so of thyroid disturbances in sterility any more than in Graves' disease in myxedema. There are certainly many cases of sterility which are cured after the administration of small doses of thyroid substance, even though the basal metabolic rate does not vary from what are normal limits for general health. Here, too, I merely mention diabetes, and for want of a better classification, anaemia of whatever grade. In both of these conditions we may find oligospermia, or various disturbances of menstruation which suggest possible deficiency in oögenesis.

And now we come to those factors which diminish fertility in the individual sexes, not forgetting that their distribution is about even between male and female. In the man the commonest structural defects are hypospadias and cryptorchidism. The former, even in slight degree, prevents proper delivery of semen at the cervical os: the latter usually means azoöspermia in the affected organ, and, if bilateral, an incurable sterility. More common are the developed structural defects. Gonorrhea and mumps create the

most damage. The latter, if contracted after puberty, is quite likely to involve one or both testicles and may utterly destroy the germinal epithelium. Gonorrhea is the great malefactor. It may leave strictures anywhere in the genital canal,—in the anterior urethra, in the posterior urethra (the region of the prostatic and ejaculatory ducts), in the vas deferens, or the epididymis. If it passes the anterior urethra it is almost certain to leave inflammatory changes in the prostate and vesicles. If it involves the epididymis, which posterior urethritis very frequently does, it its quite likely to destroy it as a patent duct.

General diseases with local involvement such as tuberculosis, syphilis, and new growths, I can merely mention. In such conditions sterility is a mere incident in a more vital misfortune, and is seldom, except perhaps in latent syphilis, the chief complaint.

One very important local condition, however, which is rarely indicated by the history, is nonspecific prostatitis or vesiculitis. In sterile matings, probably 20% of husbands who give no history of venereal disease, and have no symptoms of trouble will show an excess of pus in the prostatic secretion. Furthermore, practice has shown that their semen is distinctly improved by treatment directed to the prostate and vesicles. It is conceivable that this condition is induced by congestion, which we will mention later. Recently Macomber has laid great stress on the baneful influence of even a symptomless varicocele on spermatogenesis. If established oligospermia is markedly improved by the surgical cure of varicosities, there can be no gainsaying their evil effect, though it may be hard to see how they repress the function of the tubules.

Besides these major structural defects we often find merely functional disturbances. Impotence is not of difficult diagnosis. It has obvious disadvantages. More obscure are the results of passive congestion of the sexual organs, usually from over-use, rarely, and in only mild degree, from constipation, prolonged sedentary posture, and exposure to local chilling. Frequency of erection, with or without orgasm and ejaculation, induces venous stasis in the whole genital system, and results in time in undesirable changes in the secretions of the prostate and vesicles and perhaps in oligospermia. From great excess, also, comes premature ejaculation and finally impotence. The sexual habits of the male are very important.

The all too frequent structural defect in women, who consider themselves quite normal, is local infantilism. This may be associated with menstrual deficiency or even amenorrhea, but often has no outward manifestation. Physical examination usually finds a disproportionately long narrow cervix and a short uterine body sharply bent on each other, so that both point anteriorly. This throws the cervical canal into the axis of the vagina, and the os, against the anterior vaginal wall. Occasionally with the infantile uterus we find a stubby, button-shaped vaginal portion, likewise facing the anterior vaginal wall. Because the cervical canal runs backward in these cases, the upper part is felt through the posterior cul-de-sac, and often occasions the mistaken diagnosis of retroversion or retroflexion. Only rarely are these undeveloped uteri in backward flexion. With the infantile uterus, the vagina is often narrow or short, and though we do find cases where the cervical secretion seems normal in every way, this may be diminished. In marked infantilism the ovaries are flat, and have a sclerotic exterior. The tubes may be twisted as in the fetal condition.

The commonest deviation acquired without inflammatory disease is retroversion. In reality even this condition is developmental, for it is due to an abnormal relationship between various ligaments and the body of the uterus. Later we will consider how infantilism and malposition diminish fertility.

As in the male, likewise in the female, gonorrhea is the great devastator among inflammatory diseases; but in the female it is assisted by appendicitis, and the all too frequent puerperal sepsis. Tuberculous peritonitis also leaves its mark on the pelvic organs.

The troublesome sequelae of these infections, which remain long after the original disease, and in spite of the apparent health of the woman, are closed tubes, often with epithelium irreparably destroyed, general adhesions and fixed retroversion. Gonorrhea usually leaves also a distressing chronic endocervicitis, long after the gonococci are destroyed.

Venous congestion in the female is probably commoner than in the male. It usually, though not always, gives symptoms, but practically never fails to disturb the function of essential organs. The ovaries are swollen and tender, the tubes may be as well, and if the congestion is marked, perhaps very tortuous. The endometrium is thickened and succulent, like the premenstrual type. The cervix is swollen and purplish and exudes great quantities of thick mucus. If the circulation of the cervix is interfered with for long there is established a most stubborn inflammation of the racemose glands, which pour forth endless quantities of mucopurulent secretions.

Now how do these female abnormalities, mentioned thus far, interfere with impregnation? Above we said that the canal of the female must contain a fluid through which the spermatozoa could safely find their way with vitality unimpaired; that the egg must be able to break through the outer covering of the ovary, and, entering the Fallopian tube, find clear passage into the uterus, which, in its turn, must furnish a suitable resting place.

The misplaced infantile cervix, pointing anteriorly, is missed by a large portion of the ejaculation, the spermatozoa of which die in the

vaginal secretion before they are able to retrace their steps, as it were. Moreover, in the sharply bent canal there is usually occlusion at the internal os, at least during the premenstrual swelling of the mucosa, which dams back the secretions of the endometrium. By the time these come slowly through, it is assumed they have changed in character, and are no longer favorable to the struggling spermatozoa. In infantilism fewer follicles are able to rupture through the sclerotic covering of the ovary, and many of them probably get lost in the tortuosity of the infantile tube. The uterine mucosa is thin and offers poor nestage for the egg if it happens to be impregnated. It is not rare to find unusually fertile males able to overcome all these obstacles, only to occasion a series of tubal pregnancies or uterine abortions in their incapable wives.

The effect of closed tubes is obvious. In the retroverted uterus, if the endometrium is not too congested to permit nidation, the hyperaemia of pregnancy soon increases the stasis, and abortion is to be expected. Endocervicitis, whether following an original gonorrheal infection or as a result of passive congestion, gives forth a malicious acid mixture of pus and mucus which deters all but the most energetic spermatozoa.

Another acquired structural defect is the persistent corpus luteum, mentioned above, which prevents ovulation, and so makes vain the search of whatever number of hardy spermatozoa are able to reach the tubes.

Besides these structural defects, there is in the female the functional one of frigidity, the partial analogue of impotence in the male. Conversation with several hundred sterility patients leads one almost to believe that the absence of orgasm is normal in the modern, well brought-up female, who must be trained by an intelligent, skillful and patient husband, if she is ever to experience the joy of intercourse. Fortunately orgasm is not essential, except in those few individuals, perhaps, who, like cats, ovulate only under the effective ministration of the male.

There is no question, however, that with orgasm there is more perfect functioning of the female glandular system which then provides the desirable fluid medium for the spermatozoa. It may be that there is also the talked-of aspiration by the cervix of semen, at the moment of sexual crisis. Frigidity may be acquired or aggravated by dyspareunia. If this is present there is some discoverable cause, perhaps a caruncle, vaginitis, hymeneal granulation, condyloma, a fissure, or deeper pelvic pathology, such as malposition of the uterus or adnexal disease. Vaginismus, too, may be due to physical pathology, though it is more often a neurosis. All these obviously interfere with the normal delivery of spermatozoa at the external os.

Another peculiar female factor must be mentioned. There is apparently no contraceptive known which does not interfere in one way or another with normal female physiology. If indulged in for long, so great a change occurs in the secretions of the cervix, that sterility is almost the rule.

In attacking a given case of sterile mating, we must keep clearly in mind Macomber's law—that the fertility of any union depends on the relative fertility of the partners. For defects in one there must be excellencies in the other. The proved fertility of either mate with other partners must not mislead us into giving either a clean bill. We must watch carefully for every possible defect in both mates. Most of this search is done by the usual painstaking history and physical examination, with the usual laboratory test—on urine for albumin and sugar, on blood for Wassermann reaction, sugar if indicated, and corpuscular content and hemoglobin. In a great many cases, even in the absence of gross symptoms, basal metabolism determination is enlightening. In considering the history, and living and working and sexual habits of the two involved as well as in evaluating physical findings, we must not be satisfied because slight deviations from the optimum do not apparently influence the patient's health. We must strive to make both individuals perfect, as far as our imperfect present day knowledge permits. But more about extent of treatment later.

There are a few special examinations. The so-called Rubin test is transuterine insufflation of the Fallopian tubes, preferably with carbon-dioxide, to determine their patency. This is done with a simple apparatus, but only on cases without palpable or symptomatic pelvic disorder, and then only with great care so as not to permit dangerous distention of closed tubes.

Besides the physical examination of the husband and microscopy of the prostatic secretion, careful determination of the nature of the semen is essential. The mere presence of live spermatozoa in a fresh specimen has been proved of no consequence time and time again. As we have said above, these must be almost infinite in number, at best 100,000,000 in each cubic centimeter, and the fluid, of which there should be at least 3 cubic centimeters, must be free of gross mucus and pus. Probably most of our failures to relieve sterility have been due to overestimation of the male based on apparently adequate semen. Of defective semen, as likewise of the conditions which cause it, the man is almost always blissfully ignorant. It is not surprising that we have difficulty convincing ourselves, much less the patient, of the importance of a mild varicocele, slightly infected tonsils, scarcity of citrus fruits in the diet, lack of out-door exercise, or of mental tranquility.

I would mention also the value of post-coital examinations of the secretion of the cervix and vagina. Here we see the effect of these secretions on the spermatozoa and sometimes the reasons why spermatozoa cannot pass through.

It is surprising how frequently a check-up of the actual food consumed by husband and wife,

in the course of two weeks, discloses marked deficiency in one or the other vitamin or salt.

I should perhaps say a word about artificial insemination. It is a spectacular bit of treatment properly indulged in only under strict indications. When the only discoverable defects after careful search are either failure of delivery of semen at the external os, or failure of the spermatozoa to traverse the cervical canal, it may be thought of. It will only work if the uterus, tubes and ovaries are normal and the semen adequate. It is dangerous in the presence of even a mild prostatitis or vesiculitis. It frequently precipitates a protracted attack of what might be termed non-inflammatory peritonitis; for everything is present save the infection and the danger to life. The best time to do it is probably after menstruation when there is probably an ovum in the tube. The semen is best obtained from a condom immediately after intercourse. A vaginal specimen, because of contamination, is dangerous. Normal coitus, especially with female orgasm, undoubtedly leaves the female organs in the most receptive condition.

In the treatment of sterility we are limited by two factors. One is that the cause of the sterility is often not dangerous to health. Its relief, therefore, is purely a matter of choice for the individuals involved, and entails no responsibility on our part. Secondly we are not justified in advising surgical procedures on one partner unless the condition of the other warrants it. How futile to do a laparotomy on the wife, whose husband has azoöspermia.

I have tried to emphasize the great importance which the complaint of barreness holds, not only to the individual involved but to society and the race. I have outlined nature's method of insuring posterity; and I have enumerated the conditions most commonly interfering with this method, apart from gross general diseases which have greater importance to the patient's health. It is these lesser conditions which we find difficult to ascertain, and make the cure of sterility so uncertain. I have purposely not discussed in detail methods of diagnosis, for history taking, and physical examinations are in no way pecular to the problem at hand. They merely include finer scrutiny for and higher appreciation of the above mentioned conditions which, apart from sterility, would be of almost no consequence. Though in a later paper, I shall discuss treatment, the relief of these conditions is also not peculiar. The same principles of medicine and surgery apply.

REFERENCES

1 Kisch, E. Heinrich: "The Sexual Life of Woman." Rebman & Co., New York.
2 Reynolds, Edward, and Macomber, Donald: "Fertility and Sterility in Human Marriages." W. B. Saunders Co., Philadelphia, 1924.
3 Dublin, Louis I.: "The Fallacious Propaganda for Birth Control." Atlantic Monthly, Feb., 1926, Vol. 137, No. 2, p. 189.
4 Phillips, John C.: "Studies of the Harvard Birth Rate, Classes 1851-1860." Harvard Grad. Magazine, Sept., 1916, pp. 26-34.
"Further Studies of Harvard Birth Rate, Classes of 1891-1900." Harvard Grad. Magazine, March, 1926, Vol. 34, No. 135, p. 285.
5 Oslund, Robert: "The Physiology of the Male Reproductive System." J. A. M. A., 1928, Vol. 90, p. 829.
6 Marshall, Francis H. A.: "The Physiology of Reproduction." Second Edition. Longman, Greens & Co., London, 1922, p. 268.
7 Evans, H. Mc., and Bishop, K. C.: "The Production of Sterility with Nutritional Regimes Adequate for Growth, and its Cure with other Foodstuffs." J. Metab. Research, Morristown, N. J., 1923, Vol. III, 233.
8 Kennedy, Walter P.: "Diet and Sterility." Physiological Reviews, Baltimore, VI, 1926, p. 485.

THE FAMILIAL INCIDENCE OF EXOPHTHALMIC GOITER*

BY HYMAN MORRISON, M.D.†

THE occurrence, to my direct knowledge, of six cases of exophthalmic goiter in one family group and two in each of two other families is of interest in itself. Besides, it may be of some value to add these instances of familial incidence of this disease to the others already recorded. When a disease strikes more than one person in a family, there naturally comes up the question of what rôle heredity or constitutional predisposition may play in its etiology. In this respect exophthalmic goiter bears a close analogy to diabetes and even to tuberculosis. Heredity is a factor in the genesis of this disease, as in the others, but our knowledge in regard to it is still vague and the literature on it is unreliable. Thus in the monograph on "The Surgery and Pathology of the Thyroid and Parathyroid Glands" by A. J. Ochsner and R. L. Thompson (1910), there is cited from another author[1], the case of the infant of a woman ill with exophthalmic goiter who showed evidence of direct transmission of the disease; a more than casual reading of the original report, however, leaves no doubt that the child did not have exophthalmic goiter. Again Souques and Lermoyez[2] describe a family in which there have been seven cases of exophthalmic goiter among the sixteen members in three generations, in whom the tendency seemed to be transmitted by the males; on the other hand, Climenko[3] reports a family in whom he found the transmission along the female line. There is no doubt, however, from the numerous reports in the literature, that there is a decided family tendency to exophthalmic goiter. This is corroborated by my own experience.

My first group is that of a Jewish family that came to Boston from Hungary. The father and mother were both well and lived to an old age. They had six adult children, one son and five daughters. The son remained in Hungary, and as far as can be ascertained, his children did not have any goiter. Of the five daughters that came

*From the Medical Out-Patient Department of the Massachusetts General Hospital.

†For record and address of author see "This Week's Issue," page 102.

to this country two developed exophthalmic goiter; one was operated on by the late Dr. Maurice H. Richardson in 1911, and one was operated at the Massachusetts General Hospital in January, 1923. The other three did not have goiter. The first one mentioned had five children, among whom there has been no goiter, although they are all rather thin individuals of sensitive temperament, and one has prominent eyes and fullness in the neck. The second sister, who had herself had exophthalmic goiter, had eleven children and three of them had exophthalmic goiter, two daughters and one son. One of the daughters was operated upon at the Massachusetts General Hospital in 1909 and again in 1911, one lobe at a time. The other daughter developed exophthalmic goiter during a pregnancy and was treated at the same hospital with X-ray and subsequently became hypothyroid so that she required thyroid therapy. The son developed exophthalmic goiter in the winter of 1927 and was operated upon by Dr. Frank H. Lahey and is now well. The other children are also inclined to be thin and of a nervous temperament. The third sister of the original family, herself free from goiter, has one daughter who developed exophthalmic goiter in 1923, was relieved by X-ray therapy, but the symptoms have recurred this year. One of the daughters of a fourth sister has goiter, but as far as I can tell she was inclined to be rather hypothyroid. The children of the fifth sister have thus far been free from goiter.

In the second family I met two sisters with exophthalmic goiter. They were both born in Russia. Their parents lived to an old age. There were besides them two other sisters and one brother. No others in the family, to their knowledge, had the disease. One of the sisters developed the symptoms of hyperthyroidism in June, 1922. I saw her five weeks after the onset and she showed all the classical signs. Two X-ray treatments at the Massachusetts General Hospital controlled her symptoms and she has been well since, having gone through a pregnancy uneventfully the following year. When I last saw her in May, 1927, there were no signs or symptoms at all of hyperthyroid disease. An older sister came to me in May, 1926, with a full blown picture of exophthalmic goiter. The symptoms and signs and the rate of metabolism were so marked that it was deemed advisable to treat her surgically. She was operated on by Dr. Frank H. Lahey in July and has since been well.

In the third family there were also two sisters with exophthalmic goiter, both born in this country of Russian Jewish parents. Besides them there were two brothers and another sister without any thyroid disease. The first sister was operated on for primary hyperthyroidism in 1924 by Dr. Lahey. The second sister I had seen at different times between 1920 and 1927, always a neurotic individual complaining of rapid heart action on exertion or with excitement, but not showing any tachycardia on examination till May, 1927, when I first considered hyperthyroidism. On June 1st, 1927, the basal metabolism determination was + 40 per cent.; when repeated two months later it was + 45 per cent. with a slight loss of weight. She was operated on by Dr. Lahey, October 10, and has improved steadily since.

This report calls attention to the occurrence of six cases of exophthalmic goiter in one family group and two in each of two other families. In the first group two sisters, three children of one of these, and the child of a third sister had the disease. In the other two families there were two sisters in each. It is surely fair to consider a strong familial predisposition to exophthalmic goiter in these families. Obviously, however, direct inheritance can not be spoken of where the disease in the children occurred years before it had affected the mother. More scientific observation of such families over long periods may clarify the rôle of heredity in this disease.

BIBLIOGRAPHY

1 George Schmauch: American Journal of Obstetrics, 1909, Volume 66, page 2.
2 Rev. de Neurol. (Paris), 1919, 26, 20.
3 Cited by I. Bram: Gorber: Nonsurgical Types and Treatment, 1924, page 109.

MEDICAL PROGRESS

PROGRESS IN GYNAECOLOGY

BY FRANK A. PEMBERTON, M.D., F.A.C.S.*

ENDOMETRIOMA

THE fact that endometrial like tissue may grow in the ovaries and be implanted on the peritoneum of the pelvic cavity, intestines, appendix, round ligament, etc., is now well established. The question of how this endometrium originates is still a matter of discussion. Sampson[1] feels that pieces of endometrium flow back through the tubes in blood during menstruation and become implanted in most cases. He has proved by taking X-ray pictures of the injected uterus and tubes that the lumen of the tube is large enough to allow this to happen. He has photographed microscopic sections of pieces of endometrium found in menstrual blood, enlarged them to the same size as the tubal X-ray pictures and by comparing the two pictures has shown that some pieces of endometrium could go through the tube. He has demonstrated endometrium in blood found in tubes at operations. Gey and Cron[2] demonstrated that endometrium cast off during menstruation is viable by making tissue cultures of it which were living at the end of a month but without any increase in mass.

Another theory is that the endometrium originates in the ovary from embryonic rests. Goodall[3] says that he finds abnormal glandular tissues in about 90% of human ovaries. During the development of the ovary the germinal epithelium covering it dips down in strands through the stroma to the hilum to communicate with the parovarium. Some part of these strands become Grafian follicles later but most of them atrophies. The atrophy is rarely complete so rests of the same tissue which forms ova, and are therefore capable of producing any tissue, abound in the ovary. It is reasonable to suppose that endometrium may be formed from them. To support this both Goodall and Novak[4] have found endometrial tissue deep in the ovary and not connected with the surface. According to Sampson's theory of back flow the endometrium would be implanted on the surface of the ovary first and would be found deeper in as a prolongation.

Novak[5] has advanced another objection to the back flow theory. It is rare to find endometrium in the tubes even though many thousands of sections are examined. In the few cases in which he has found such tissue the pieces have been too large to go through the isthmus of the tube. He does not feel that it is reasonable to suppose that endometrium exfoliated during menstruation has vitality enough to become implanted in the pelvis after it reaches there. When he has found endometrium in the tubes it has not been at the time of menstruation. In some such cases he has found an endometrial tumor in the ovary and it seemed more reasonable to suppose that the tissue in the tube came from the ovary and was progressing toward the uterus, that being the normal current of flow in the tube. He therefore leans to the theory of embryonic rests in the ovary developing into endometrium.

Both Sampson and Novak have demonstrated normal endometrium and cancer of the endometrium in the lymphatics of the uterine wall and ovary so it is possible that the implantations may occur through this channel.

The fourth theory is that the endometrium is due to a metaplasia of the cells of the peritoneum. This again rests on an embryonic theory for the germinal epithelium covering the ovary, and originally forming the Graffian follicles, and the peritoneum have the same origin. Therefore peritoneum may develop into any tissue. This has no practical or experimental proofs in its favor.

It is generally agreed that the back flow theory explains most cases but that the embryonic rest and lymphatic metastatic ones are possible and may occur.

Blood is found in the tubes following a curettage more frequently than without a curettage. The dilators used in stretching the cervical canal act as pistons, forcing the contents of the uterine cavity out into the tubes. This has a bearing on cancer of the fundus because particles may be forced out and get into the pelvis causing metastases. Therefore the curettings should always be examined microscopically at once and if cancer be found an immediate hysterectomy should be done. The first step on opening the abdomen should be to ligate the fimbriated ends of the tubes to prevent leakage from them.

There is nothing new in the symptomatology or treatment of endometrial adenomata.

THE FUNCTION OF THE OVARY

It is generally agreed that the ovary secretes a hormone which influences the development of the genital organs especially and the body as a whole also. There is still discussion as to which part of the ovary secretes the hormone, whether there are one or more hormones, and in just what way menstruation is controlled. The substance itself has not been isolated chemically but can be demonstrated by the subcutaneous injection of extracts of the various parts of the ovary or the whole ovary into animals and noting whether their genitalia develop or estrus occurs.

*For record and address of author see "This Week's Issue," page 102.

For instance Pratt and Allen[6] have used monkeys and humans who have had the ovaries removed. They injected hypodermically extracts of the fluid from Graffian follicles and found that the uterus developed and although no bleeding occurred, the humans complained of the molimena of menstruation which they had had before being castrated.

It is generally agreed that the follicles of the ovary produce the hormone. Frank[7], Pratt and Allen, and Allen and Dorsey[6] all agree on that. Frank and most others have found it in the corpus luteum and Frank feels sure that he has proved it to be the same as the one elaborated by the follicle. He calls this the "female sex hormone." Frank has also found it in the placenta, as have some others, where it may be manufactured or perhaps only stored up. Frank has also demonstrated it in the circulating blood as the time of menstruation approaches and in the blood of pregnant women up to the sixth month at least.

Frank sums up the present theory excellently as follows:

"Kingery, Gustavson and I not only have shown that puberty may be induced in very immature animals, as previously known, but also that when the threshold of artifical puberty has been passed, the immature female organism is able and does continue this premature cyclicecal function without further stimulation. In the feminine organism puberty, therefore, sets in when the threshold of elaboration of the female sex hormone has been reached. The ovary through its follicle, secretes the active substance. The tubular tract receives this substance through the circulating blood, responds to the stimulation by undergoing muscular and endometrial hyperplasia, the vaginal mucosa also responding to the effect of the hormone. These changes in the lower forms we are accustomed to call the preestrual change. In the animals studied the acme of the reaction is reached at the period called estrus at which time alone coitus is accepted; in the human female the passing of the highest point of the reaction is marked by menstruation.

"We have noted that the amount of the female sex hormone present in the circulating blood varies greatly during the menstrual cycle, an abrupt increase taking place especially noticeable one to two days before the menstrual flow is due, but present in some instances as early as thirteen days before the period occurs. The highest concentration is noted immediately before the onset of the period. With the onset of menstruation the hormone abruptly disappears from the general circulation (i. e., is no longer demonstrable by our present methods), but during the first day of the menses, sometimes during the second day also, the hormone is found in the menstrual excretion in a strength of from five to fifteen times that noted in the circulating blood.

"Based upon these observations, the following generalizations can be made. They were enunciated by Gustavson and myself even before these last corroborative observations had been added. The function of the adult ovary consists in elaborating a hormone which produces two types of cycles. The one we have called the fertile or complete sex cycle, consisting of maturation of the follicle with its attendant tubular reaction (pregravid reaction), ovulation, impregnation, the elaboration of the corpus luteum, nidation, and pregnancy. Pregnancy is atended by the formation of a placenta which in turn sends the female sex hormone into the circulation and assures the continued hyperplasia of the uterus and accessory sex organs throughout pregnancy. Its acme is reached with the onset of labor.

"The other, called the short, infertile or abortive cycle, does not differ from the fertile one until ovulation has taken place, impregnation for one reason or another having been prevented or not occurring. The corpus luteum then involutes rapidly and therefore the acme of the reaction is reached at estrus in the lower forms or at the time in the human female when the female sex hormone is excreted in the menstrual flow. It is, of course, evident and self-understood that the main, in fact the sole, function of the female sex organs is for the perpetuation of the species. To emphasize this function of follicles, corpus luteum and placenta, we call them collectively 'the gestational gland'."

There is some reason for believing that the corpus luteum secretes a substance which prevents menstruation because if a corpus luteum is removed at operation, menstruation appears earlier than it should and if it be done during the early months of pregnancy an abortion frequently follows. Papanicolaou[8] experimented with guinea pigs by the former method to prove that they reacted this way and then tried injecting an extract of the corpus luteum into normal guinea pigs which apparently caused a delay in ovulation and estrus. He believes that the corpus luteum hormone has an inhibitory action opposed to the female sex hormone of Frank and therefore the function of the corpus luteum of pregnancy, which lasts longer than the ordinary one, is to neutralize the effect of the sex hormone. The luteal extract does not cause an enlargement of the genital organs in the spayed animal as does the sex hormone. He accounts for both hormones being found in the young corpus luteum by saying that it is able to secrete both, the sex hormone being formed by the granulosa cells and the other by the full formed luteal cells.

One of the most interesting points in this work is the possibility, by Frank's method of

quantitating the amount of secretion in the blood, or differentiating between amenorrhoea due to the absence of the hormone and that due to a persisting corpus luteum. Also in distinguishing various types of menorrhagia and metrorrhagia which may be due to over-production of the sex hormone. Further Frank has proved the sex in two individuals where no palpable uterus or ovaries could be found on examination by demonstrating the female sex hormone in the blood.

This work is interesting and will lead to more intelligent production and use of ovarian extract in the treatment of disease and to the isolation of the specific chemical substance which is effective. At present however the use of ovarian extracts does not give constant results. There is no unanimity of opinion as to whether the extract of the whole ovary, that of the corpus luteum, or that of the ovary without the corpus luteum is the most effective. These extracts are used for a variety of diseases and at times with success. They appear to be of most use at the menopause, both normal and induced by operation or radium, to relieve the hot flushes and other nervous symptoms. In amenorrhoea they are not at all reliable, one reason being that lack of thyroid secretion and the general health play such a large part in causing amenorrhoea. In dysmenorrhoea they are sometimes useful in relieving the pain, more often in relieving the nervous symptoms, but rarely give complete comfort. They seem to have little effect in menorrhagia. It is generally conceded that hypodermic administration is more effective than oral.

Novak[9] feels that the results of animal experimentation do not throw much light on the human because there is so great a difference in the menstrual function. He thinks that the treatment with ovarian extracts is of most value in hypofunction; that both the follicle and luteal extracts should be used but in a proper sequence simulating the menstrual cycle; and that hypodermic administration is much the surer.

Graves[10] summarizes the use of ovarian therapy as follows: It is a near-specific in the treatment of hot flushes and the vaso-motor disturbances of the menopause. It is ineffective in the treatment of amenorrhoea with hypoplasia, menorrhagia, and metrorrhagia. It is occasionally useful in essential dysmenorrhoea and the molimenal symptoms of dysmenorrhoea. It seems to be beneficial in sterility which might be caused by deficient ovulation. The preparations of the whole ovary or ovarian residue are more efficacious than those of the corpus luteum.

CANCER OF THE CERVIX

The exciting cause of cancer of the cervix is generally agreed to be a chronic inflammation. There are three outstanding clinical observations as follows: (1) Over 90% of patients with cancer have had children or miscarriages and in many of the others a history of a dilatation or some operation on the cervix can be obtained. (2) Cancer of the cervix is a disease of poor people. (3) Cancer of the cervix is rare in combination with procidentia.

The opinion is not that the laceration or trauma is the irritant but that they produce conditions which favor chronic infection and that is the irritant. Cancer has been found starting in the laceration itself in only a few instances. It appears long after the lacerated surface has healed over.

It is a disease of poor people because they have less skilled obstetrical care and especially because they do not pay as much attention to the chronic discharge of endocervicitis. Schroeder says that there were in his hospital clinic 100 cases of fibroids to 61 of cancer while in his private practice there were 332 of fibroids to 61 of cancer. Dr. Reynolds told the writer several years ago that after he confined himself to private practice he rarely saw cancer of the cervix while cancer of the fundus was not uncommon. Schmitz has found that the number of children born has no relation to the incidence of cancer.

It is rare in cases of extreme prolapse where the cervix is at or outside the entrance to the vagina. This may be because there is no collection of discharge in the vagina to keep the cervix macerated, that is there is good drainage. It may also be due to the fact that the epithelium is exposed to conditions which make it resistant to irritation. On the other hand it is constantly irritated by the clothing, so much so that chronic ulcers form, called decubital ulcers, which exist for months and years without showing any malignant change. It would seem therefore that the discharge and constant maceration were the basic factors in causing cancer.

Murray[11] described cancer in a case of procidentia as a rarity. Macleod[12] says that procidentia occurs in women who bear their children in rapid succession never giving the uterus time to get back to normal and it would seem that these conditions would be favorable to the development of cancer yet cancer combined with procidentia is rare. He believes that some change takes place in the epithelium which makes it less likely to proliferate. Polak says he has never seen cancer develop in complete procidentia. He says that when a decubital ulcer appears the patient becames alarmed and seeks treatment before malignancy can develop. The writer's experience has been that these ulcers may be present for months and years without any change. Therefore on the whole the feeling is that chronic inflammation, poor drainage or lack of cleanliness, and maceration of the tissue are the exciting factors.

Bonney[13] has stated that all cervical cancer is preceded by erosion of the cervix and McCann[14] believes that the chronic inflammation of gonorrhoea leads to cancer.

It would seem worth while therefore to watch

and repair lacerated cervices which are chronically inflamed. If the laceration is not very bad it may be treated by the cautery in the office instead of by operation. It has been found that by cauterizing in radial lines the exposed glands may be destroyed, the discharge is lessened giving the raw surface opportunity to heal, and the scar tissue of the cautery wounds contracts causing a rolling in of the everted cervix to some extent.

There has been some agitation recently about the occurrence of cancer in the stump of the cervix left after doing a supravaginal hysterectomy. Complete hysterectomy has been advocated as a better operation both on account of that reason and also because it prevents the occurrence of chronic discharge from the stump which is a fairly common sequence to a supravaginal hysterectomy. All acknowledge that in the average hands the bigger operation has a higher mortality. Hochman[15] reviewed 1114 cases of supravaginal hysterectomy done at the Woman's Hospital in New York and found that cancer of the cervix developed later in only 3 cases. In 263 cases of cancer of the cervix only 1.14% occurred in stumps left after a supravaginal hysterectomy. The difference of opinion depends entirely on whether the occurrence of cancer later outweighs the greater mortality of the more dangerous operation. It seems to us that that is a question of operative skill and the surgeon should act accordingly. There are methods of compromise. If the cervix is lacerated and infected it may be cauterized, repaired, or amputated as a preliminary to a supravaginal hysterectomy. A favorite and surer compromise is to cone out the cervix from above in one piece with the top of the uterus thus removing the infected area. The objection to this is that it is difficult to suture the shell of cervix left so that it will not bleed immediately after operation or 8 to 10 days later when the sutures soften up.

Graves[16] in an excellent article on cancer in gynaecology shows that atresias and stenoses in the genital tract play a part in causing cancer. Sixty per cent. of cancers of the cervix occur in women who have had the change of life with its accompanying atrophy. Imperfect drainage is caused by stenosis from ulceration, scar tissue, and atrophy in the cervix; by voluminous folds of the vaginal wall; and by a small external vaginal opening. The same thing occurs with cancer of the body of the uterus. It appears nearly always after the menopause and is common in nulliparae in whom the genital atrophy is more likely to cause obstruction. He cites two cases of atresia of the cervix with large hydrometrae and extensive carcinoma of the endometrium and three of marked stenosis of the vagina or introitus with cancer of the endometrium in one and of the cervix in the others. The pent up secretion is a chronic irritant to the epithelium. A similar analogy may be found in ovarian cysts. The serous cysts are more likely to became malignant than others however because their epithelial lining is more nearly like uterine epithelium. The cells lining the pseudomucinous cysts are more highly differentiated, possibly have a pseudo-physiological function and are under greater restraint against malignant changes.

It is very difficult to evaluate the better method of treatment, radium or operation, for cancer of the cervix because there is no universal system of classification of the extent of the disease and that is the fundamental point in the treatment and end results. Also every one has a different method of using combinations of operation, radium, and X-ray. The best one can do in reading various reports is to decide whether the conclusions drawn are proven by the facts cited.

All agree that radium is the treatment of choice for cases with extension to the vaginal wall and broad ligaments, that is inoperable cases. The treatment relieves the discharge and frequently the pain. The disappearance of the local growth is miraculous in many cases, the patient gains weight, and goes back to her normal life for some time even up to two or three years. In a few cases the growth appears to be stimulated so that the patient dies comparatively quickly. Especially noteworthy however is the fact that some of these hopeless cases are apparently cured. Heyman[17] of the Radium Institute in Stockholm cites 16.7% of 5 year cures, Regaud[18] of Paris 17% and Bailey[19] of Memorial Hospital, New York 8.6%. These cases would have stood practically no chance with operative measures.

Most authorities incline towards the use of radium in the borderline cases where it is a question of whether or not the operation can remove all the growth. Healy[19] cites 353 cases of all types at the Memorial Hospital and believes that radium is giving better results in all than operation. Spaulding[20], 117 cases, is using radium more and more. Ransohoff[21], Robineau[22] and Regaud[18] also.

In the operable cases Forsdike[22], 157 cases, thinks operation is better but it should be preceded by X-ray and radium treatment. Faure[22] uses operation, and Provest[22] believes surgical relief is more lasting.

There seems little doubt that operation should be reserved for distinctly operable cases and as the operation is difficult, carrying a high mortality and morbidity, it should be done only by skillful surgeons. It also seems reasonable that radium properly used should be as effective as operation in early cases and it has the further advantage of having practically no mortality and morbidity. It certainly should be used in early cases when the patient is obese or has some other disease which increases the danger of operation. The use of radium should be contingent on having a sufficient supply.

Attempts have been made to find some rela-

tion between the type of cell found in cancer of the cervix and the result of treatment. Fluhmann[23], Pemberton[24], Martzloff[25] and Kimbrough and Norris[26] have published papers on this subject. Squamous carcinoma may be classified as to the predominating cell into spinal, transitional, and fat spindle types. It is generally agreed that the degree of malignancy is in that order progressing from least to most. Martzloff and Kimbrough get the best end results in the spinal type though the latter finally concludes that they are practically the same in all. All the writers agree that the more highly malignant fat spindle type gives the best immediate result of the three with radium but the final result is about the same as recurrence occurs. Martzloff and Kimbrough show that the extent of the disease at the time of treatment is a more definite prognostic factor than the type of cell and Pemberton shows that the more stroma and the less tumor tissue present, the better the prognosis. The type of cell does not indicate that operation or radium may be better for one type than another. Although the fat spindle cell is more susceptible to radiation than the others the dose of radium should not be decreased accordingly. Fluhmann feels that the presence of large number of eosinophiles in the tissue is a favorable prognostic sign when radium is used.

FIBROIDS

Miller[27] in an extensive article on fibroids says that they occur more frequently in the negro than in the white race in the proportion of 10 to 1; they are more frequent in nulliparae; inflammatory conditions of the adnexa are prone to be present; and that deaths from circulatory disturbances are 25 times as frequent following operations for fibroids as after other surgical operations. The reason for the last fact is that chronic hemorrhage, pressure effects, and toxemia may occur with fibroids.

The present treatment of fibroids depends on the age of the patient, whether or not children are desired, the size of the tumor, and the presence of complications. In general it may be said that a myomectomy is the operation of choice during the menstrual life because it conserves menstruation and the internal secretion of the ovary and does not sterilize the patient. If the situation or size of the tumor prohibits it then a hysterectomy may be done if conservation of the ovary is important or radiation may be used if not. To get the desired effect with radiation it is necessary to cause amenorrhoea, that is destroy the ovarian secretion. Therefore radiation is contraindicated during the child bearing age if myomectomy is feasible. At and after the menopause radiation or operation may be used if desired. There are definite contraindications to radiation. If the tumor is larger than a four months' pregnancy or there are pedunculated fibroids operation is preferable. Large tumors are more likely to be calcified or have other types of degeneration which do not react well to radiation. Pedunculated tumors may become necrotic. Accompanying diseases such as inflammation of the tubes and cysts of the ovaries are contraindications to radiation as they are not relieved and may be aggravated by it. Prolapse, appendicitis and other abdominal diseases complicating fibroids call for operation. Most important of all cancer of the cervix and endometrium must be ruled out by an ether examination, curettage and rush diagnosis before radiation is employed. This is not uncommonly neglected with disastrous results at times. These are the criteria employed by the Mayo Clinic[28], Polak and Clark of the University of Pennsylvania[29], and Miller[27] of New Orleans. The Mayo Clinic report 6 cases of malignancy appearing within a year after radiotherapy and in general some cases that were radiated required treatment again, either operative, 18%, or radiation, 13.7%, while cases operated on required further treatment in only 4%. With more careful selection of cases in the later years fewer radiated cases required further treatment. Clark obtained satisfactory results in 90% of the radiations and 95% of those operated on. The mortality with radium and uncomplicated operated cases was nothing. The complicated cases which were operated on had a 3% mortality. Therefore here as every where else in medicine, the treatment depends on careful diagnosis.

MENORRHAGIA

Meigs[30] has observed that thrombopenic purpura hemorrhagica is a cause of uterine bleeding and patients with menorrhagia should be questioned as to the occurrence of purpuric spots in their skins. Also he finds that some cases of menorrhagia are accomplished by hypothyroidism so that it is wise to do a metabolism test on all such cases before restoring to radiation because the use of thyroid extract may relieve them. In line with this is the observation by Gardner-Hill[31] that when myxoedema develops before the menopause menorrhagia occurs also in 78% of cases and that myxoedema is a common signal to the artificial menopause. There is an interrelation between the ovaries and thyroid gland and no treatment should be instituted until the function of the thyroid is known. Klemperer[32] also describes menorrhagia occurring with thrombopenic purpura hemorrhagica. He has tried splenectomy but it is not as successful as radiation treatment of the spleen and long bones.

TUBAL INSUFFLATION

The Rubin test of passing gas into the uterus and tubes to determine whether they are patent or not is established on a sound basis. Accidents have been rare because it has been done

only by the specialist up to the present. Morkane[33] reports on 140 cases. It should not be done in the presence of any infection in the tubes or cervix. The best time for it is a few days after menstruation. The fall in pressure as shown by the manometer during the introduction of the gas and the pain felt by the patient in her shoulder on sitting up after the test are proof that the tubes are patent. The pressure should not be raised over 200 and one negative test is not proof that the tubes are closed. It may have some therapeutic value in clearing out the tubes or in breaking fresh adhesions if done soon following a salpingostomy. Moench[34] cites two cases which came under her observation. The physician who insufflated them had had a large experience. In one he did a curettage following the test and the patient died in a few minutes. The autopsy showed closed tubes and air in the inferior vana cava and heart. In the other case the patient also collapsed and died in a few minutes. Air was found in her heart also. The lesson is obvious. Polak's comment is good, "An intact endometrium is Nature's safe-guard against the admission of foreign substances or air into veins."

Rubin[35] has further amplified his test by injecting radiographic fluids and noting the result by the fluoroscope and X-ray pictures. It outlines the uterine cavity as a triangle normally but if there is a submucous tumor it may show the distortion caused by it projecting into the cavity. It shows whether or not the tubes are patent and the point at which they are obstructed. Those who have used it all feel that it is more accurate than the insufflation of a gas and no more dangerous. Rubin has observed especially the peristalsis in the tube by means of the fluoroscope and found that waves ran along the tube from the fimbrium towards the uterus at the rate of 5 to 9 to the minute.

RETROVERSION

There has been a good deal of discussion in the last two years as to whether or not retroversion of the uterus is a pathological condition requiring operative treatment. This was aroused by an editorial in Gynaecology and Obsterics condemning all suspensions of the uterus for retroversion as unnecessary and dangerous from the possibility of postoperative intestinal obstruction. It has led to a really valuable thing, the more accurate classification of retroversions into congenital, acquired, and retroversion with complications.

The congenital type is found in young unmarried, or nulliparous women where no cause can be found for the position of the uterus. This is the class that may be symptomless or which may be accompanied by dysmenorrhoea, the type consisting of cramps relieved on the appearance of the flow.

The acquired retroversion without complications usually follows childbirth and frequently causes no symptoms at first but most of them will eventually become members of the third class.

Meyer-Wirz[36] found 29% out of 507 retroversions in these first two classes. McGrath[37] found 47% of retroversions in single women in these classes and 10% of retroversions in married women. As Polak says marriage, infections and pregnancy change a congenital symptomless retroversion into the symptom producing type.

The third class then consists of retroversion with other complicating conditions. McGrath found 95% of his 1000 cases in this class and Meyer-Wirz 71%. The complications are disease of the cervix, of the adnexa, pelvic adhesions, prolapse and its accompanying cystocele and rectocele, and tumors. It is clear then that attention should not be focused on the position of the uterus but on the accompanying pathology which is the real cause of the symptoms. The correction of the position of the uterus is merely one step in the treatment. If the case is one of prolapse during the child bearing age a pessary is inserted to relieve the prolapse and that cannot be relieved without correcting the position of the uterus. If an operation is required it is for the complications and not primarily to correct the position of the uterus but the uterus should be held in place by some mechanical method to prevent further complications. If pelvic adhesions are separated more or less raw surface is left and if the uterus is not suspended by some method it will almost certainly become adherent again and retroverted. The same is true following myomectomy, adhesions are much less likely to form if a suspension is done. In prolapse requiring operation, a recurrence is common if plastic operations on the vaginal wall are done without a suspension. The type of suspension is relatively unimportant for satisfactory results are reported with several kinds. Regarding post operative obstruction no definite figures can be given but considering the large number of suspensions done and the rare reports of obstruction it does not seem as if it were any commoner than it is after any abdominal operation.

In line with this Lynch[38] and Ward[39] have investigated backache occurring in patients with gynaecological diseases. Lynch says that it may be due to the pelvic disease because it has been cured in 76.5% of 510 women who were operated on for various troubles. It was cured in 50% of the ovarian tumors, 72% of the chronic pelvic inflammations, 79% of the relaxed vaginal outlets in women under 40; 80% of the fibroids, 81% of the retroversions and flexions, and 37% of the procidentias. He thinks that the pelvic congestion is the actual cause of the backache. Ward says that it is a prominent symptom in 50% of cases and that 85% of these are gynaecological in origin. He feels that the actual cause is congestion, traction on the supports, and pressure on the pelvic nerves.

SEDIMENTATION TEST

There is a laboratory test which may be of help in gynaecology called the sedimentation test. It depends on the speed with which the blood corpuscles settle to the bottom in citrated blood observed in standardized test tubes. The method used by Baer[40] is as follows: Glass tubes 5 millimeters in diameter and 6.5 centimeters in length with a capacity of more than 1 cubic centimeter are marked at the 1 cubic centimeter point and at every 6 millimeters above this point. Two tenths cubic centimeters of a 5% sodium citrate solution is drawn into it from one of the patient's veins. This is shaken well and put in a sedimentation tube and allowed to stand. The time is noted which elapses until the corpuscles have settled to the 18 millimeter mark. In normal people this averages about 180 minutes. Baer found, and others agree so we may take his figures as an example, that the presence of pathology in the pelvis quickened the rate of settling of the corpuscles. For instance hydrosalpinx and fibroids showed a time of 166 and 153 minutes. Ovarian cysts 112 minutes, chronic salpingitis 91 minutes, subacute salpingitis 53 minutes and acute salpingitis 28 minutes. A series of clean abortions varied from 52 to 73 minutes while infected ones showed the same drop as the acute salpingitis cases. During the convalescence the sedimentation rate lengthens as the patient improves, but it does so before the leucocyte count and temperature go down. Similarly it shortens if the patient is getting worse although the temperature and white count may stay the same. It is pretty well established that if a patient is operated on while she has a short sedimentation time there is more danger from the infection and the convalescence will be stormy. It appears to be a more delicate criterion of the virulence of the infection than the white count, temperature, and general appearance of the patient. In gynaecology it should have its greatest value in deciding when to operate on cases of pelvic inflammation where decision is difficult. If the patient's sedimentation rate is taken at appropriate intervals and does not lengthen although every thing else is favorable, operation should be postponed. Smiley[41] feels that a rate of 2 hours or over means that bacteria have disappeared and the infection is at a standstill. Polak and Mazzola[42] repeat the test daily or weekly and obtain a curve on the chart which gives the course of the disease as compared to the temperature and white count. Bemschek and Douglas[43] and Noyes and Corvese[44] come to conclusions similar to those to be quoted after trying the test on large series of cases. Troubitsine's[45] conclusions in regard to this test seem to be logical and are as follows: (1) The sedimentation rate is not a specific reaction for a definite affection. (2) The causes of rapid sedimentation being found in various gynaecologic conditions, the rate has no diagnostic value. (3) The rate may be regarded as a criterion of health and disease and as an indication of the time for intervention; a slow rate is a guarantee of a healthy condition of the organism, while a rapid sedimentation is a sign of a morbid state without indicating its nature.

REFERENCES

1 Am. J. Obst. and Gynec., Oct., 1927.
2 Am. J. Obst. and Gynec., May, 1927.
3 Am. J. Obst. and Gynec., Oct., 1927. (Discussion of Sampson's article.)
4 Am. J. Obst. and Gynec., Oct., 1927.
5 Am. J. Obst. and Gynec., Oct., 1927.
6 J. A. M. A., June 26, 1926.
7 J. A. M. A., Nov. 20, 1926.
8 J. A. M. A., May 8, 1926.
9 J. A. M. A., Oct. 15, 1927.
10 J. A. M. A., Oct. 15, 1927.
11 Brit. Med. Jour., May 1, 1926.
12 Brit. Med. Jour., July 3, 1926.
13 Gynecology—Practical Medicine 1926—p. 503.
14 Brit. Med. Jour., May 22, 1926.
15 Am. J. Obst. and Gynec., Apr., 1926.
16 J. Obst. and Gynec. Brit. Emp., 1927.
17 Brit. Med. Jour., Nov. 7, 1925.
18 Gaz. des Hopitaux, Paris, Mar. 10, 1926.
19 Am. J. Obst. and Gynec., Dec., 1925.
20 California and West. Med., Sept., 1925.
21 Ohio State Med. Jour., Sept., 1926.
22 Gaz. des Hopitaux, Paris, May 1, 1926.
23 Am. J. Obst. and Gynec., Feb., 1927.
24 Am. J. Obst. and Gynec., Oct., 1926.
25 Bull. Johns Hopkins Hospital, Mar., 1927.
26 Am. J. Obst. and Gynec., Mar., 1927.
27 Ohio State Med. Jour., Nov., 1927.
28 Surg., Gyn. and Obst., Feb., 1926.
29 Am. J. Obst. and Gynec., Oct., 1925.
30 Am. J. Obst. and Gynec., Aug., 1927.
31 Lancet, Apr., 1927.
32 Monatschr. J. Geburt. und Gynak., Nov., 1926.
33 M. J. Australia, Aug. 27, 1927.
34 J. A. M. A., Aug. 13, 1927.
35 J. A. M. A., Aug. 28, 1926.
36 Schweiz. med. Wock., Feb. 13, 1926.
37 Surg. Gynec. and Obst., Feb., 1926.
38 Am. J. Obst. and Gynec., Nov., 1926.
39 Am. J. Surg., Mar., 1927.
40 Am. J. Obst. and Gyn., Sept., 1925.
41 Med. Jour. and Record, July 7, 1926.
42 Am. J. Obst. and Gynec., Nov., 1926.
43 Am. J. Obst. and Gynec., Aug., 1927.
44 Northwest Med., Aug., 1927.
45 Brit. Med. J., Aug. 7, 1926.

Case Records
of the
Massachusetts General Hospital

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED IN WEEKLY CLINICO-PATHOLOGICAL EXERCISES

EDITED BY R. C. CABOT, M.D.

F. M. PAINTER, A.B., ASSISTANT EDITOR

CASE 14211

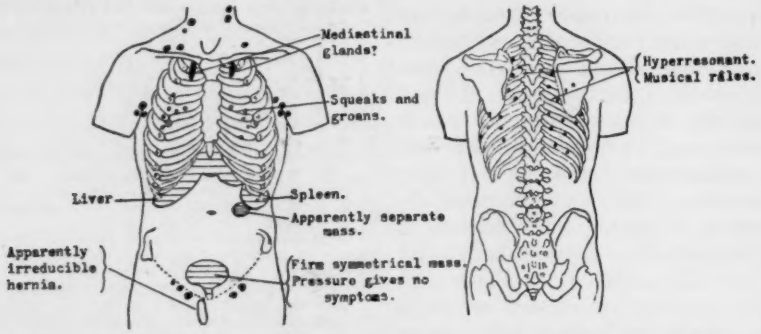
CERVICAL ADENITIS WITH WEAKNESS AND PALLOR

MEDICAL DEPARTMENT

An American eighty-one years old entered the hospital October 28 complaining of weakness, pallor and need of a tonic. A brief history was given by the physician who referred him.

Twelve years before admission he had hematuria, according to his daughter. Three years before admission glands in his neck were noticed. He did not know about fluctuation in size. He continued to work without symptoms until three weeks before admission, when he became weak and pale and stayed at home. Two weeks before admission he noticed that a right inguinal hernia which he had had for ten years had become irreducible. He had eaten very little since that time. Two days before admission he was seen by a physician and a urologist of this hospital. The former found 120 abnormal lymphocytes in the blood and the masses described in the report of the examination below. The latter thought that a mass felt by rectum was not malignant and was puzzled by a suprapubic mass. The non-protein nitrogen was 90. For some reason there was a question of stones in the kidney. The patient was referred for immediate X-ray therapy.

Examination showed an emaciated, decrepit, hoarse, pale old man who said he felt very well. He was very dyspneic, with a suggestion of Cheyne-Stokes' respiration. The skin was very dry and showed ancient pigment. There was some pyorrhea. The mouth and tongue were very dry. There were pea-sized glands in the cervical and inguinal regions, walnut sized in the axillae and very small glands in the epitrochlear region. The chest was barrel shaped. Air seemed to enter both lungs normally. There was an occasional musical expiratory squeak and slightly increased dullness on the left of the sternum in the second interspace. The apex impulse of the heart was felt 8.5 centimeters to the left of midsternum, 1 centimeter outside the midclavicular line, coinciding with the left border of dullness. The right border was not found. Supracardiac dullness 6 centimeters. The heart sounds were very hard to hear. The action was slow and regular. There was an apical systolic murmur. The artery walls were beaded, hard and tortuous. The blood pressure was 130/70. Abdominal masses were felt as shown in the diagram. The suprapubic mass looked at first glance like a distended bladder, but hard pressure on it caused no symptoms whatever. Rectal examination showed a few hemorrhoidal tabs. Meeting the examining finger in the region of the prostate was an irregular, very hard mass nearly encircling the rectum on the anterior three-quarters of it as far as the examining finger could reach. The extremities showed hyper-



trophic arthritis and senile tremor. The pupils and reflexes were normal.

Urine normal in amount, pink at the single examination (following a renal function test), alkaline, specific gravity 1.014, a trace of albumin, sediment loaded with leukocytes. Renal function 0. Blood: 124,000 leukocytes, 13 per cent. polymorphonuclears, 80 per cent. lymphocytes, 2 per cent. large mononuclears, 5 per cent. eosinophiles, hemoglobin 55 per cent., reds 3,720,000, achromia, slight anisocytosis and poikilocytosis, platelets increased. Wassermann negative. Stool negative.

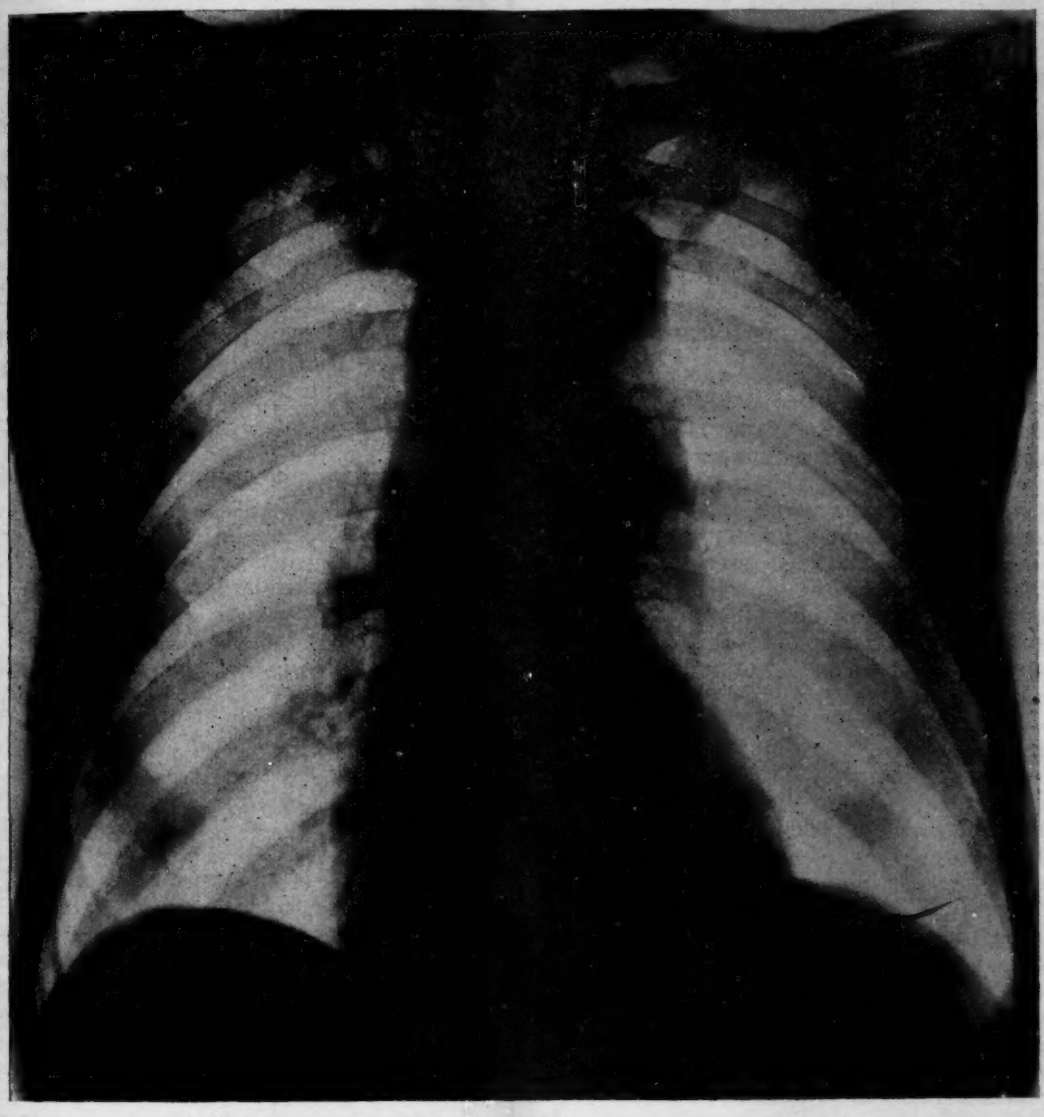
X-ray examination showed the diaphragm normal in outline and position. The lung fields were clear. The supracardiac shadow was increased. The aorta was tortuous. There was no definite evidence of glands.

Temperature 100° by mouth to 98.1° by rectum, pulse 87 to 111, respirations 20 to 29.

A urological consultant reported: "I cannot differentiate the prostate from the rectal infiltration or the mass in the pelvis. I feel sure that there is a bladder residual which accounts for part of the suprapubic mass. I do not believe the rectal mass to be malignant prostate. . . There is sufficient cause for hematuria in a large in-

fected residual urine without making the kidney a causal factor."

X-ray treatment over the spleen was started in small doses. The patient's voice became weaker and his mental condition more cloudy. By November first he was incontinent of urine, dazed, weak and slightly disoriented as to time. November 2, with no other symptom of impending death, he suddenly ceased to breathe.



The diaphragm is normal in outline and position. The lung fields are clear. The supracardiac shadow is increased. The aorta is tortuous. There is no definite evidence of glands.

Discussion

BY RICHARD C. CABOT, M.D.

NOTES ON THE HISTORY

I seriously dispute that opening sentence. I think there is no such thing as a tonic, so I think nobody can need it.

That is as unsatisfactory a past history as I have seen for a long time. We hear that he had hematuria a good while before his admission and that he has a hernia, now irreducible, and something about masses in the pelvis. I do not see how we can make much of that. We have to go on to the physical examination.

NOTES ON THE PHYSICAL EXAMINATION

"The heart sounds were very hard to hear." That may perfectly well be due to a barrel chest. Often with a perfectly normal heart we do not hear the sounds well when the chest is that shape.

That mass was probably the bladder.

There are glands in the neck and some dullness, which makes us suspect also mediastinal glands. Also there are râles with hyperresonance.

I think he certainly had some disease in the mediastinum. I do not believe you can have that

amount of enlargement along the aorta without there being a pathological process, presumably malignant disease, in the areas where the sharply defined X-ray shadows are. I think we can clearly see the heart inside these. It cannot be the pericardium. I should suppose it had to be neoplasm, and presumably malignant disease.

That is a satisfactory kind of renal function if we can take it on its face value, and I suppose we can. Nothing is said about evidence of tumor there, and I do not know why he should not put the drug through his kidneys so far as any local condition is spoken of. There is nothing to make us think of a chronic process like nephritis. The ureters are not blocked.

I am surprised that the radiologists say nothing more about the mediastinal shadow. They say the aorta was tortuous, so they evidently did not think it was aorta.

The X-ray treatment over the spleen was started on the basis of leukemia undoubtedly.

DIFFERENTIAL DIAGNOSIS

I can make no diagnosis except lymphatic leukemia. I believe it will be shown in this shadow about which the X-ray men are so conservative. It must be malignant disease either in the thymus or in the glands. I have no doubt that the mass in the pelvis is the same thing. Exactly where it starts I know no way to tell. He ought to have the same process in the liver, in the spleen and in the other organs.

A STUDENT: How about nephritis?

DR. CABOT: That renal function is a little disturbing. Yet we have nothing else to point to nephritis.

A STUDENT: How about the non-protein nitrogen?

DR. CABOT: Ninety. Yes, that is rather high.

A STUDENT: Couldn't you get hard masses by infiltration with lymphocytes?

DR. CABOT: Yes.

A STUDENT: Would that account for the bladder?

DR. CABOT: Yes. I think the suprapubic mass is a leukemic infiltration. But I do not know in what organs it is.

A STUDENT: Do you consider infectious lymphocytosis?

DR. CABOT: I think it is a real thing. I do not think it needs to be considered here. You do not have tumor masses anywhere in acute infectious lymphocytosis.

A STUDENT: Does not the blood picture suggest it?

DR. CABOT: If you had the blood alone, yes, although the leukocyte count in lymphocytosis is usually between 10,000 and 50,000. 124,000 is rather high, but there are a few cases as high as that on record. I think we can rule it out on the presence of tumors.

A STUDENT: Does the bladder tumor interfere with the renal function test?

DR. CABOT: It is perfectly possible that there was damage to the kidney also, but I do not suppose it was extensive in view of the other facts given us about the urine.

A STUDENT: Does the phthalein test include urine collected two hours after the dye is injected?

DR. CABOT: "Following a renal function test." We do not know how long after it. But I assume it was after the ordinary two hours.

A STUDENT: Would he have more constitutional symptoms with this disease?

DR. CABOT: With leukemia? No. He has plenty, I think. He says he feels very well, but that is obviously due to a mental condition, perhaps the euphoric state when a patient is deluded about his own condition.

A STUDENT: Is this the age when you would expect leukemia?

DR. CABOT: Yes, it is a usual age. But you can have leukemia at any age.

A STUDENT: Do you exclude Hodgkin's disease?

DR. CABOT: The presence of such a blood would be in itself enough to exclude Hodgkin's disease according to the ordinary definition.

CLINICAL DIAGNOSIS (FROM HOSPITAL RECORD)

Malignant lymphoma, lymphatic leukemia.
Uremic coma.

DR. RICHARD C. CABOT'S DIAGNOSIS

Lymphatic leukemia, lymphoblastoma.

ANATOMIC DIAGNOSES

1. *Primary disease.*

Lyphoblastoma of the bladder, kidneys, spleen and intestines.
Lymphatic leukemia.

2. *Secondary or terminal lesions.*

Arteriosclerosis.
Abscess of the right spermatic cord.

DR. TRACY B. MALLORY: This is another case of one of the very many possible manifestations of lymphoma, which in itself presents two different types, one the typical leukemic increase of lymphocytes in the blood, the other a definitely sarcomatous infiltration of many organs and tissues.

The large mass felt in the pelvis was a diffuse sarcomatous infiltration of the walls of the bladder and the rectum, almost completely filling the entire pelvis. The bladder wall showed complete destruction of the muscular layer, and a large residual of urine must have been present. In this an infection developed that had worked backward into the pelves of the kidneys and later into the kidney parenchyma itself, producing multiple abscesses. The involvement of the kidney was not however entirely infectious. There was also a very marked leukemic infiltration. It is difficult to decide which of the two processes

was responsible for the greatly lowered function.

The bronchial glands were enlarged, although not very markedly so.

The irreducible hernia turned out to be not that, but an abscess in the wall of the spermatic duct.

The spleen is more nearly the picture of a Hodgkin's disease than of the ordinary leukemic infiltration. I think you know that we believe here that all the various diseases sometimes called Hodgkin's, lymphatic leukemia, mycosis fungoides, small round cell sarcoma and a dozen other names, are all essentially one disease, one neoplasm which on different occasions manifests itself in various ways. One of our chief reasons for believing this is that in a great many cases we get a combination of one, two or three of these types. In this case we have a very definite combination of two of them with a suggestive appearance in the spleen of Hodgkin's disease.

CASE 14212

FATAL ALBUMINURIA WITHOUT NEPHRITIS

Medical Department

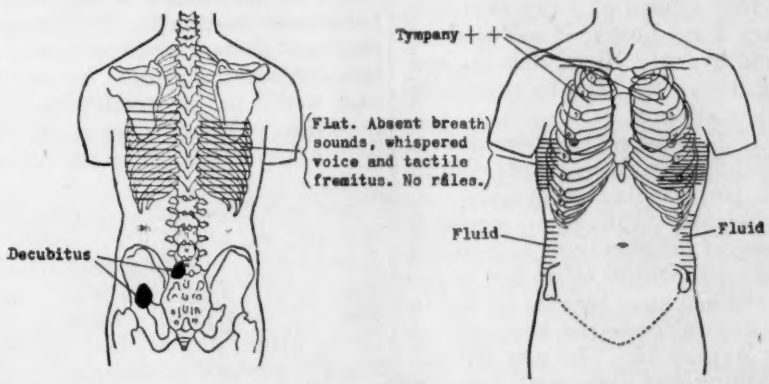
A Canadian stenographer of twenty entered the hospital August 9 complaining of swelling of the ankles and eyelids and anasarca. She was so ill that the history was believed to be rather incomplete.

Four months before admission she felt tired. A week later she had a sudden onset of swelling of the ankles and the eyelids and felt so tired and weak that she gave up work and by advice of a physician went to bed. She had a great deal of gas on her stomach. She passed very small amounts of urine, perhaps five or six ounces. She had no pain at this time. She had no appetite. Four weeks before admission she had gas pain. Her abdomen was tapped and five quarts of light colored fluid withdrawn. She now passed varying amounts of urine, sometimes a normal amount. Another abdominal tap gave six quarts of fluid. The first part of the tap was clear like water; the last few drops were like milk. A left chest tap gave a pint of clear fluid. Five physicians were unable to do anything for her, and gave her up. For the past two and a half months she had had a doctor who gave her a pint of digitalis and some medicine which he said was weakening to the kidneys. She made no improvement. For ten days she had eaten no solid food. During the past week she had vomited clear liquid and nearly everything taken. Her stools, which had been previously normal, were frequent and watery. She felt drowsy. During the past week she had felt worse, very weak, and had been incontinent of urine, passing very little.

Her family history is irrelevant.

As a child she had measles, chicken pox and tonsillitis. A year before admission she noticed hemorrhoids for six months. Later these were very painful and bled bright red blood two or three times a day. Her bowel movements had been well formed, with blood, she did not know for how long. In November, nine months before admission, she had many boils on her face. In April she had slight leukorrhea at the time of menstruation. Until the present illness she weighed 102 pounds.

Clinical examination showed an emaciated young woman with a puffy face, pale mucous membranes and general anasarca excepting only the anterior chest wall. Bilateral hydrothorax. The lung signs were as shown in the diagram. When she lay flat tympany obscured the heart borders. The apex impulse of the heart was not found. Left border 7.5 centimeters to the left of midsternum, half a centimeter outside the midclavicular line, right border 3.5 centimeters, supracardiac dullness 6 centimeters. Sounds and action normal. There was a soft systolic murmur at the apex. Pulses and arteries normal. Blood pressure 100/60. The abdomen was greatly distended with gas. There was a moderate amount of shifting dullness, no tenderness. No masses were palpable with the degree of distention present. The genitalia were edematous. There were thrombosed external hemorrhoids, so tender that rectal and pelvic examinations could not be done. There was marked edema of all the dependent parts with decubitus over the sacrum. The pupils were equal, regular, and reacted sluggishly to light. The right fundus was slightly hazier than the left.



Amount of urine 32 to 37 ounces on the three occasions recorded, specific gravity 1.020 to 1.012, urine cloudy at three of five examinations, alkaline once, a trace to a large trace of albumin at all of five examinations, 5 to 20 leucocytes at all of three sediment examinations, rare red cells once. A fourth specimen was polluted. A urine culture showed colon bacillus. Blood: 29,700 to 7,600 (?) to 32,200 leukocytes, polymorphonuclears 75 per cent., hemoglobin 50 per cent., reds 4,030,000 to 2,850,000, smear normal. Non-protein nitrogen 38 milligrams. Creatinin 1.62 milligrams. Stool, guaiac negative. Abdominal tap: 5,500 cubic centimeters of slightly cloudy white fluid, no clot, specific gravity 1.003, 710 cells, 30 per cent. polymorphonuclears, 70 per cent. lymphocytes, total protein 66.87 milligrams, non-protein nitrogen 26, uric acid 2.57, culture (1) colon bacillus, (2) no growth. A guinea pig test showed no evidence of tuberculosis.

Temperature at entrance 99.5°, afterwards normal. Pulse 90 to 120. Respirations 9 (morphia) to 21, with a terminal increase to 34.

Orders. August 9. Gatch bed. Mouth care. Cracked ice at bedside. Karell diet. Opium suppositories half a grain twice a day. Morphia 1/6 grain p.r.n. every three hours for headache, restlessness and dyspnea. Oil enema to be given with extreme care,—to be retained. Magnesium sulphate 1 ounce every morning. Tincture of digitalis 30 minims twice a day. August 10. Morphia 1/6 grain s.c. at bed time and repeat every three hours p.r.n. for sleeplessness. Each dose may be followed in thirty minutes by morphia 1/8 grain if not effectual. August 12. Frequent feedings of high caloric fluids. August 14. Rectal taps, four ounces of 5 per cent. glucose in saline every three hours; if not well tolerated add chloral hydrate 10 minims to each tap. Veronal 5 grains. Ice bags to anticubital fossae.

August 12 and 13 25 cubic centimeters of 5 per cent. calcium chloride was given intravenously. There was slight perivascular ecchymosis and necrosis from accidental infiltration, probably unavoidable because of delicate veins and edematous skin. It was impossible to judge of the diuretic effect of the medicine because of her incontinence. The general anasarca however was much reduced by August 15. She was still unable to retain anything but very small amounts of pure water. Rectal taps were all expelled. There was no increase of ascites. August 17 the blood chloride was 532.3 milligrams. The patient steadily lost three to four pounds' weight daily. The edema decreased. August 18 she died.

Discussion

BY CHESTER M. JONES, M.D.

NOTES ON THE HISTORY

I saw this patient while she was in the hospital ward. The history was very unsatisfactory and a note was made at the time that she was so sick that a complete story could not be obtained. One thing stood out, however,—that she was extremely ill, had fluid collected in the various cavities, and had in addition a subcutaneous edema which did not respond to cardiac treatment. Before admission she became much worse from excessive vomiting. The description of the two abdominal taps is peculiar. The fluid obtained was said to be milky at the end of the tap, but certainly was not that seen in chylous ascites. I cannot explain the appearance of the fluid as described in the history.

From the history above one could not make an accurate diagnosis. One would naturally think of chronic nephritis, but such a diagnosis could at best be only a provisional one.

NOTES ON THE PHYSICAL EXAMINATION

The diagram shows typical signs of fluid in the pleural cavity on each side. The tympany above it is simply the only portion of expanding lung not covered by fluid and therefore giving that note.

The apex impulse of the heart was obviously not found because of the fluid. I should be very much inclined to doubt the accuracy of the percussion of the borders because of the fluid. Six centimeters is a little broad for supracardiac dullness, particularly in a young woman of twenty.

The blood pressure is certainly not increased, in view of other findings.

I think this is an unsatisfactory ophthalmological report. I presume it means that the edge of the disc was hazier on one side than on the other, but without a better description I should be inclined to discount it. Unless she has chronic nephritis there is nothing else in the picture that can explain a haziness or choking of the disc that would fit in at all with the signs that she presents. Nephritis as such, unless associated with hypertension, does not cause changes in the discs.

She can concentrate urine perfectly well. A rare red cell in the urine, particularly when the examiner is expecting nephritis, I think can be discounted. There are plenty of normal persons who will occasionally show a very rare red cell in the urine, just as they will occasionally show a slight amount of albumin in the urine. Very frequently the red cell that we have to hunt for turns out not to be a red cell. The finding of colon bacilli fits in perfectly well with the finding of leukocytes in the urine. In a catheter specimen this is of real significance.

The smear could not have been quite normal with that degree of anemia, but it apparently was not abnormal enough to create much interest.

The colon bacillus in the abdominal fluid is presumably a contamination, but it may not be because she was tapped twice before she came into the hospital, and while it is extremely un-

common we occasionally have an infection from an abdominal paracentesis. The specific gravity of the fluid is extremely low, one of the lowest I have ever heard of. It is practically water, and this is interesting in view of the fact that the number of cells is distinctly increased, with a moderate number of polynuclear cells, indicating that there may be an infection in the peritoneal cavity. That is a very unusual finding, because with a fluid that is distinctly a transudate there seems evidence of irritation which might conceivably be infectious. The findings on the belly fluid are interesting because they show a low total protein, a low non-protein nitrogen, and a uric acid which is within normal limits.

I should say, with the physical examination and the history, that the most likely diagnosis is that of some kidney disease. The curious thing is that the few facts we have regarding the kidneys are that there is a trace of albumin, that the patient can concentrate her urine perfectly well, the specific gravity going to 1.020; there were no casts and practically no red cells, and no nitrogen retention whatever, in spite of a large trace of albumin in the urine. This is certainly not the common picture of nephritis. She is obviously very ill, and she is ill because of a disease associated with anasarca, presumably of renal origin, yet it is not at all the picture of uremia. There is no mention of uremic breath, of convulsions, or of any picture at all associated with nitrogen retention. She had a moderate anemia at first which gradually increases. There is no evidence that she is bleeding in any of the examinations. I should say that for a case of this gravity and of this type the number of successful examinations were rather few. I presume that they took some blood and obtained a hematoma, or else gave her some medicine intravenously with a resultant hematoma, and are treating that.

There was some thought at first that she might have heart failure.

She apparently had lost a good deal of fluid and a great deal of weight due to the fact that she had been vomiting for a long time, and they were trying to get fluid into her in small quantities and with as high a caloric intake as possible.

The blood chloride figure is definitely down, which of course is due to her vomiting and the resultant loss of chlorides.

She died in spite of the fact that she was getting rid of her anasarca.

DIFFERENTIAL DIAGNOSIS

There are several contradictions in the treatment, which certainly points to the fact that the diagnosis was not clean cut at any time, and I think there is one distinct mistake,—the use of ammonium chloride intravenously as a diuretic. It should have been given by mouth, because it is only when acidosis is produced by this drug that diuresis is obtained, and we get none if it is given intravenously.

In making a diagnosis we should have to consider first some type of nephritis. Heart disease must be considered, but I believe we have no picture of such a heart disease as would give such anasarca. Heart disease alone with myocardial failure rarely is associated with edema of the eyelids, which she had on several occasions. She might have adherent pericardium. That is conceivable, and as a result of that she might have an accumulation of fluid in the abdomen and the pleural cavities, but there are no physical findings to support that diagnosis. The man who examined her apparently thought her heart was not large, although it is not possible to accept the heart measurements as accurate because there was so much fluid in her chest. She had no friction rub, therefore there is no reason to suspect pericarditis; and there is nothing in the past history to make us suspect rheumatic or tuberculous involvement of the pericardium. She might have Pick's disease, but here again there is no evidence to make us suspect mediastinitis or perihepatitis. Cirrhosis should be considered, and it could explain almost all of the picture. On the other hand it would have to be of the Laennac type, and cirrhosis of that type in a person with no alcoholic history is not particularly common.

The only other diagnosis which seems to me tenable is the disease known as nephrosis, about which there is a great deal of discussion from time to time, and a certain amount of doubt as to whether such a disease exists or not. In favor of nephrosis it seems to me is the fact that with this edema there is no evidence, with the exception of the albumin, of renal irritation. There is a low blood non-protein nitrogen, and the abdominal fluid also showed a low non-protein nitrogen, although it is not necessary that that be absolutely the same figure as the blood. The uric acid also was not high in the abdominal fluid, and the creatinin was not elevated in the blood. It is unfortunate that more blood determinations were not made, but she had exceedingly small veins and it was practically impossible to take repeated samples of venous blood.

In favor of nephrosis are the facts that we have a very marked anasarca with albuminuria. Unfortunately there is no determination of the total protein in the blood. In so-called nephrosis the total protein of the blood is diminished, and the disease is supposed to manifest itself by albuminuria without other urinary changes except occasional casts. In some cases tubular changes are reported. I am not sure that this is a constant finding, but it does occur in some cases. One expects to find a high cholesterin in the blood, also a low basal metabolic rate. Those were not determined.

Against nephritis, it seems to me, is the low blood pressure. If the nephritis was severe enough and chronic one would expect to get some

elevation of blood pressure. 100/60 is apparently a terminal blood pressure, but she has been sick, from her own story, for only four and a half months before death, and I should expect that if she had typical nephritis her blood pressure would be much higher.

The character of the fluid that was obtained it seems to me is rather typical of the so-called nephrosis, a very low gravity fluid, a typical transudate. I do not understand why so many cells were found in the abdominal fluid, but I think probably because so many taps have been done. If one repeats too frequently, even with no mistake in asepsis, one will get some increase in cellular content. Nothing is said about red cells being present. I think probably it is due to irritation but not to a true infection.

Apparently she has some evidence of cystitis or pyelitis. On the other hand twenty cells per high power field is not a very high figure unless this is a catheter specimen. I presume it is a catheter specimen, otherwise they would not have bothered to culture. So I think we have to admit that there may be some infection of the genito-urinary tract. The leukocytosis may be explained by that. I see no other reason for a leukocytosis of about thirty thousand. That is extremely high for what would appear to be a very moderate genito-urinary infection.

In regard to treatment, if she has what has at times been called chloride retention nephritis —and I think that condition probably is very similar to nephrosis—then she should not have had such treatment as rectal taps of glucose and saline, because the one thing to avoid is salt because of the base in it. The one thing to do is to try to eliminate the base or pull it out of the tissues. Magnesium sulphate should be avoided for the same reason. A diuresis could have been obtained theoretically if she had received large amounts of ammonium chloride or calcium chloride by mouth, with the production of an acidosis and possibly the addition of some mercurial such as novasurol. If her kidneys were badly affected it probably would have made no difference whatever.

We shall have to say that she has a kidney lesion, nephrosis. It does not fit into my idea of nephritis causing death. Nephrosis is known to cause death with just such a picture. I think it has been our experience in the hospital that most cases of so-called nephrosis have shown some evidence of renal irritation in addition to the presence of albumin. This case apparently shows none unless we accept the fact of rare red cells on one examination. Most of our cases have shown casts and red cells occasionally.

Miss Painter: That was a catheter specimen.

Dr. Jones: Then I think we have to say that in addition to the probable nephrosis she has a genito-urinary infection.

The usual treatment for nephrosis is a high protein diet, a restriction of fluid, and occasionally thyroid extract. Thyroid extract does act as a diuretic under certain conditons and apparently does help some of these cases.

Patients with this disease usually die in a few years. This girl certainly had a very severe case which did not manifest itself at all until four months before admission,—a very unusual case.

Dr. Cabot: If she had just taken a lot of mercury for suicidal purposes it would fit very well, wouldn't you say?

Dr. Jones: Yes. Although I should say that if it had been a number of weeks rather than four and a half months it would fit better. Usually we get renal changes within a few weeks after mercury. I forgot to say that such a picture has been described as due to syphilis. She had no evidence of it at all.

CLINICAL DIAGNOSIS

Chronic nephritis with edema.
General arasarca.
Secondary anemia.

ANATOMIC DIAGNOSES

Lipoid nephrosis.
Bronchopneumonia.

Dr. Tracy B. Mallory: The kidneys were increased in size, about 400 grams, which is large for so small a girl, weighing less than 100 pounds. At necropsy the cortex was a very bright lemon-yellow color, and the pyramids stood out very sharply as a bright pink. The capsules stripped quite readily, almost falling back of their own accord. This gross picture is consistent with only two conditions that I know of. One is the so-called lipoid nephrosis, the other is subacute glomerulonephritis in which a secondary fatty degeneration of the tubules is sometimes quite marked. In the latter case however one might expect to find hemorrhages in the cortex and very possibly an adherent capsule. The pelvis on each side was very slightly reddened and congested, as were also the ureters. So mild a degree of pyelitis and cystitis, however, would by no means be sufficient to explain her symptoms. Microscopic examination of the kidneys shows almost negative glomeruli,—but not quite. There is a very slight increase in nuclei and one can occasionally find leukocytes in ameboid motion in and out of the capillaries, a very slight evidence of inflammation. In proportion to the severity of her symptoms it is almost incredible that the disease of the glomeruli should have caused death. The tubules on the other hand showed throughout an extreme fatty degeneration. That is the typical picture described by Fahr from the pathological side and Volhard from the clinical side as lipoid nephrosis, and the clinical history so far as it goes is entirely consistent with that diagnosis.

Some clinicians and pathologists doubt whether this is truly a disease entity. They claim that the tubular changes are never found unassociat-

ed with glomerular lesions, and I believe that is true. But the relative proportion of the glomerular and the tubular changes in these cases is so marked that it is hardly conceivable that the glomerular changes should cause the symptoms. Even if one wishes to consider it as a glomerulonephritis one must make a subtype of glomerulonephritis to cover it.

Almost invariably these cases die as a result of secondary infection rather than immediately from the kidneys, and pneumococcus infections are particularly frequent. Staphylococcus also is not uncommon. This girl had a bronchopneumonia at the base of both lungs which probably accounts for her leukocytosis.

The changes in the other organs were not marked, although microscopic examination showed many fat globules in the liver and in the myocardium.

DR. JONES: Did the heart show a good deal of fatty infiltration or not?

DR. MALLORY: There was no infiltration of fat tissue, but every muscle cell contained many minute fat droplets. It is an extremely small heart, atrophied rather than hypertrophied. There was a moderate degree of atheroma, quite a little more than one would expect in a girl of this age, but all in the form of fat deposits beneath the intima without scarring or any of the later changes of arteriosclerosis.

A PHYSICIAN: Is nephrosis found more commonly in children than in adults?

DR. MALLORY: Much more commonly. A good deal of confusion arises, I think, because both clinician and pathologist use the term and do not always use it to mean the same thing. From a pathological point of view the process is defined as a primary degenerative process in the kidney, in contrast with the inflammatory processes such as glomerulonephritis. The evidence for that is that one gets very little in the way of leukocytic infiltration or proliferative changes. The changes usually found consist in various types of necrobiotic phenomena, such as a marked granular degeneration of the tubule cells (cloudy swelling) as well as, in the more severe cases, the formation of quite large hyalin droplets, and in still other cases, as in this particular type, a marked fat deposit. This may go on to complete necrosis of the cells. According to this classification the bichloride kidney falls under the group of nephrosis and is of course much the commonest type. The pediatrists see most of the cases other than the bichloride kidneys and their cases usually show a hyalin droplet change of the tubule cells. I think one cannot go far wrong if one takes the term nephrosis as almost synonymous with the old term of acute tubular nephritis.

The pediatrists, especially throughout the Middle West, feel very strongly that staphylococcus infections have a great deal to do with the etiology. They report a great many cases in connection with stapylococcus infections of the throat, mastoids, etc., and claim that by clearing up those foci they can clear up the renal process. The results in Boston and I believe throughout the Eastern states have been very discouraging. The cases in children have been almost invariably fatal.

DR. JONES: I understand she had a streptococcus infection before this began.

DR. YOUNG: In other words, once started is this a progressive disease in almost all cases?

DR. MALLORY: I am not quite sure of that. It is quite possible that there are mild cases which recover. The Germans make the claim that there are a great many cases diagnosable as nephrosis clinically which never come to necropsy.

DR. JONES: We have had one or two cases of nephrosis not quite so definite as this case. They did have high blood cholesterol and low total protein. One case returned to the hospital a year after the original admission with the same symptoms and one patient appeared who had been here twice.

DR. MALLORY: We have one other necropsied case showing a definite nephrosis of the hyaline-droplet type. He had a luetic history with a course of salvarsan begun but not completed, and died with a staphylococcus mastoiditis. Cases are very rare in adults, and it will probably be some time before we see another case.

A PHYSICIAN: Is the non-protein nitrogen low in these cases?

DR. MALLORY: Almost invariably.

DR. JONES: It is one of the distinguishing things about it. One of the curious things in this case is that there were so few casts or no casts.

DR. MALLORY: Yes, she should have had casts with that degree of degeneration.

DR. CABOT: You would not say that in adults it is very rare when people are in the habit of using corrosive sublimate, would you?

The New England
Journal of Medicine

SUCCESSOR TO
THE BOSTON MEDICAL AND SURGICAL JOURNAL

Established in 1828

Published by THE MASSACHUSETTS MEDICAL SOCIETY under the jurisdiction of the

COMMITTEE ON PUBLICATIONS
HOMER GAGE, M.D. JOHN W. BARTOL, M.D.
ROGER I. LEE, M.D. ROBERT B. OSGOOD, M.D.
EDWARD W. TAYLOR, M.D.

EDITORIAL STAFF
DAVID L. EDSALL, M.D. STEPHEN RUSHMORE, M.D.
REID HUNT, M.D. HANS ZINSSER, M.D.
JOHN P. SUTHERLAND, M.D. BENJAMIN WHITE, PH.D.
GEORGE R. MINOT, M.D. HENRY R. VIETS, M.D.
FRANK H. LAHEY, M.D. ROBERT N. NYE, M.D.
SHIELDS WARREN, M.D.

WALTER P. BOWERS, M.D., *Managing Editor*

ASSOCIATE EDITORS
GEORGE G. SMITH, M.D. WILLIAM B. BREED, M.D.
JOSEPH GARLAND, M.D.

THE NEW HAMPSHIRE MEDICAL SOCIETY
PUBLICATION COMMITTEE
D. E. SULLIVAN, M.D. EMERY M. FITCH, M.D.
JOSEPH J. COBB, M.D.

THE VERMONT STATE MEDICAL SOCIETY
PUBLICATION COMMITTEE
WILLIAM G. RICKER, M.D. C. F. DALTON, M.D.
J. A. WARK, M.D.

SUBSCRIPTION TERMS: *$6.00 per year in advance, postage paid for the United States, Canada $7.04 per year, $7.56 per year for all foreign countries belonging to the Postal Union.*

Material for early publication should be received not later than noon on Saturday. Orders for reprints must be sent to the Journal office, 126 Massachusetts Avenue.

The Journal does not hold itself responsible for statements made by any contributor.

Communications should be addressed to The New England Journal of Medicine, 126 Massachusetts Avenue, Boston, Mass.

RABIES

WE were recently privileged to publish a dissertation of Rabies by Milton J. Rosenau, M.D.*

The Massachusetts Commissioner of Public Health has tried to project into the minds of the citizens of this state the importance of dealing with this disease according to adequate preventive measures. The important facts are open to any one interested in the personal and public health problems involved. Some persons have attempted to obstruct regulations designed to protect the people from the dangers incident to rabies. This attitude is not confined to Massachusetts as shown by the publication in the *Bulletin of the New York City Department of Health* of an article under the title: "The Disgrace of Rabies", in which it is recorded that 659 persons in New York City were bitten by rabid dogs in 1927. This is an increase of 371 persons or 130%, bitten by rabid animals as compared with the number recorded in 1926. Six persons in New York City died from rabies in 1927.

The Massachusetts Director of Animal Industry reports that:

"Rabies is on the increase to an alarming extent as shown by the reporting of 797 positive cases during 1927 as compared with 324 cases the previous year. Rabies is a preventable disease; inasmuch as the infection is practically always transmitted by a bite and since the animal that does the biting is almost always a dog, all that is really necessary is to restrain or muzzle *all* the dogs, and the disease would be under control in from 90 to 120 days."

The responsibility for the suffering, deaths and expense of this disease lies with the obstructionists to a large degree.

This country has failed to profit by the example set by England, Holland, Ireland, Australia and Sweden where proper regulations are in force and rabies is practically unknown.

Since this country is unprogressive with respect to dealing with this disease doctors should include the problems of rabies in the courses of instruction which up-to-date practitioners are expected to give to the families under their care with the hope that better appreciation of the recommendations of public health officials may lead to legislation which will confer adequate authority on those who would act to prevent the spread of rabies if given sufficient power.

*New England Journal of Medicine, Volume 198, No. 15, page 787.

UNDULANT FEVER

THIS name has been suggested by the Malta Branch of the British Medical Association in place of the designation Malta fever because it is found in widely scattered localities. Several cases have been reported in New York State and one in New York City.

For some time the disease was supposed to be caused by drinking infected goat's milk but the same disease or one practically identical has been found to be due to the bacillus which is responsible for contagious abortion in cattle.

The clinical symptoms are those connected with undulating temperature curves. There may be no apparent local pathology. The blood of patients with this disease reacts to agglutination tests and in doubtful cases may be the only means of making a diagnosis. Contagious abortion of cattle is somewhat prevalent in this country and should be considered in those cases where there is illness with continuous irregular temperature without recognizable local lesions.

THIS WEEK'S ISSUE

CONTAINS articles by the following named authors:

SISE, L. F. M.D. Harvard, 1901. His subject is: "Spinal Anesthesia for Upper and Lower Abdominal Operations". Page 59. Address: 605 Commonwealth Avenue, Boston.

DAY, HILBERT F. Ph.B., M.D. Harvard, 1905. F.A.C.S. Surgeon-in-Chief, Boston Dispensary; Surgeon, Cambridge Hospital; Associate in Surgery, Peter Bent Brigham Hospital; Faculty Instructor in Surgery, Harvard Medical School; Consultant to various hospitals. Address: 412 Beacon Street, Boston. Associated with him is:

LEVENSON, WALTER S. A.B., M.D. Harvard, 1922. Junior Assistant Surgeon, Boston Dispensary; Surgical Outpatient Department, Beth Israel Hospital. Address: 11 Wabeno Street, Roxbury, Mass. Their subject is: "Novocaine in the Reduction of Fractures", Page 66.

ROSE, DAVID. M.D. Tufts College, 1926. Interne, Cambridge Hospital; Assistant Medical Resident, Boston Sanatorium; Interne, Boston City Hospital. His subject is: "Local Anesthesia in First and Second Stages of Labor". Page 68. Address: Boston City Hospital, Boston.

WEISS, SOMA. A.B., M.D. Cornell, 1923. Instructor, Department of Medicine, Harvard Medical School; Assistant Physician, Boston City Hospital and Assistant, Thorndike Memorial Laboratory, Boston City Hospital. Address: Boston City Hospital, Boston. Associated with him is:

RHOADS, CORNELIUS P. A.B., M.D. Harvard, 1924. Instructor, Department of Pathology, Harvard Medical School; Assistant, Department of Pathology, Boston City Hospital. Address: Boston City Hospital, Boston. Their subject is: "Healing and Healed Vegetative (Subacute Bacterial) Endocarditis". Page 70.

LENNOX, WILLIAM G. A.B., M.A., M.D. Harvard, 1913. Assistant in Medicine and Research Fellow in Neuropathology, Harvard Medical School; Assistant, Thorndike Memorial Laboratory and Assistant Visiting Physician in Neurology, Boston City Hospital. His subject is: "Ketogenic Diet in the Treatment of Epilepsy". Page 74. Address: Boston City Hospital.

STETSON, RICHARD P. A.B., M.D. Harvard, 1926. Medical Resident, Huntington Memorial Hospital, 1926-1927; Medical House Officer, Massachusetts General Hospital, 1927-1928. His subject is: "The Effect of High Voltage, Short Wave Lengths, Roentgen-ray Exposure on the Circulating White Blood Cells". Page 76. Address: 188 Marlborough Street, Boston.

LEE, HAROLD G. M.D. Yale University School of Medicine, 1922. Orthopedic Surgeon Carney Hospital, Boston. Orthopedic Surgeon St. Luke's Hospital, New Bedford, Mass.; Sol-E-Mar Hospital, South Dartmouth, Mass.; Central Maine General Hospital, Lewiston, Maine; Elliott Community Hospital, Keene, N. H.; Peterborough Hospital, Peterborough, N. H. His subject is: "Rotaro-lateral Curvature of the Spine Secondary to Hypertrophy of the Heart". Page 78. Address: Carney Hospital, Boston.

ROCK, JOHN. S.B., M.D. Harvard, 1918. F.A.C.S. Assistant in Obstetrics and in Gynecology, Harvard Medical School; Obstetrician to Out-Patients, Boston Lying-In Hospital; Surgeon to Out-Patients, Free Hospital for Women, Brookline. His subject is: "The Problem of Sterility". Page 79. Address: 198 Commonwealth Avenue, Boston.

MORRISON, HYMAN. A.B., M.D. Harvard, 1908. Visiting Physician, Beth Israel Hospital; Physician to Out-Patients, Massachusetts General Hospital; Associate Professor of Clinical Medicine, Tufts College Medical School (1928). His subject is: "The Familial Incidence of Exophthalmic Goiter". Page 85. Address: 483 Beacon Street, Boston.

PEMBERTON, FRANK. S.B., M.D. Harvard, 1909. F.A.C.S. Assistant Visiting Surgeon, Free Hospital for Women; Instructor in Gynaecology, Harvard Medical School; Consulting Gynaecologist, New England Deaconess Hospital. His subject is: "Progress in Gynaecology (Endometrioma). Page 87. Address: 198 Commonwealth Avenue, Boston.

BOSTON MEDICAL LIBRARY

DR. NATHAN SMITH

1762-1829

How much better "foresight" is than "hindsight"; just as much more useful as head lights are than tail lights. With the one you avoid mistakes when you are a "going concern",—and the other is not of much use except when you are standing by the roadside waiting for traffic to pass. "Hindsight" is reminiscent, telling you of what you might have done and is a warning, in a certain sense. The tail light cautions those who are more progressive to give you room. Medical Education in New England would have been in a better position today had there been individuals in the Council on Medical Education blessed with Nathan Smith's foresight. Had this been the case it is doubtful if Dartmouth Medical School would have been compelled to abandon the last two years of its medical course. One, who in appreciation of the future medical needs of New England, was wholly instrumental in certain cases, and largely so in others, in organizing the Medical Departments of Dartmouth in 1798, Bowdoin in 1821, Yale in 1813 and the University of Vermont in 1820 was most certainly as unlikely to need a tail light as anyone on the road to higher medical education. He thought that no State needed more than one medical school and to that extent he was probably right, even granting that large metropolitan centers furnish greater advantages in amount and variety of clinical material than can be obtained in smaller communities. However, a small amount of material, thoroughly digested, has many advantages and a great deal may be said for the value of training material, suitable for the making of doctors, in the region whence it comes rather than sending it away. Other things being equal the State of Maine youth who is educated at Bowdoin should be a better doctor for the people where the majority of his kind will be likely to start to practice than had he gone, for example, to Jefferson or Johns Hopkins. Moreover he will be far more likely to go

back to his native heath than he would were he obliged to go so far away. Furthermore a certain number of men, constituting the very best material from which to make doctors cannot afford to go away and they, therefore, are forever lost to medicine.

A brief account of the life of the man who had so much to do with the making of New England Medical History should be interesting. Nathan Smith's ancestors came from Norfolk County, England, settling temporarily when they landed in 1638 from the "Diligent", in Hingham. The branch of the family from which the subject of this sketch was derived removed to Rehoboth and it was in this town on September 30, 1762, that Nathan Smith was born. His father was one of the pioneer farmers who went to Vermont and settled in the town of Chester. While a youth Nathan Smith was called upon to render such help as a bystander might at the amputation of a leg, which was being done by Dr. Goodhue, to whom he indicated his desire to become a doctor. Goodhue advised him what to study in preparation for an apprenticeship and was surprised about a year later to have Smith call upon him for the purpose of applying for that privilege. He was accepted and for three years studied with Dr. Goodhue in Putney, Vt.; between these two a strong and lifelong friendship was established. When he was twenty-five years old he started, his practice in Cornish, N. H. This was in 1787. He realized his educational disadvantages and took steps to remedy them so far as he was able by going to Cambridge where he took a degree in medicine in 1790, one of the first four graduates of the Harvard Medical School. He returned to Cornish where he resumed practice and married. He was impressed with the need for more and better trained doctors. There were at that time only three medical schools in the United States viz: Harvard, Columbia and the University of Pennsylvania. He applied in June 1796 to the Trustees of Dartmouth for permission to teach the Theory and Practice of Medicine and Surgery. It was two years before the School was opened and he became the first professor. While the Dartmouth trustees were making up their minds with respect to the advisability of developing a medical school he went abroad to fit himself for the opportunity he believed would be offered him and visited Glasgow, Edinborough and London where he learned many things and came in contact with many of the distinguished groups of Scottish physicians of that period. Soon after his return he entered upon his duties at Dartmouth. He gave one course of lectures before he received an official appointment. He antedated Dr. Oliver W. Holmes in occupying a "settee", instead of a chair, for he lectured on Anatomy, Surgery, Chemistry and the Theory and Practice of Physic. He gave these lectures without salary from the College and with very meagre fees from the students, supporting himself and family by a practice calling for long and difficult travel and yielding small pecuniary return. A roster of the students in the Medical School for 1800 and 1801 shows the success of his efforts and contains the names of several who later became distinguished. From 1798 to 1828 a comparison of the popularity of the medical departments connected with Harvard and Dartmouth shows that from the former 230 were graduated while from the latter there were 340.

The move from Hanover to New Haven was undertaken for reasons not recorded, though certainly through no feeling of dissatisfaction on the part of the Dartmouth authorities. In New Haven there was a larger faculty and help in giving the courses left him more time for practice but collections were very poor in New Haven and a family of ten children, four of whom were preparing to study medicine, made it necessary that some one should be adding to the family exchequer. About this time President Allen of Bowdoin entered into negotiations with Dr. Smith with a view to establishing a medical department in connection with that institution. With the help he was getting in New Haven and with the promise of help in Brunswick it seemed feasible to carry on lectures in both places and he accordingly proceeded with the first course at Bowdoin in the summer of 1821. President Allen of Bowdoin was the son-in-law of President Wheelock of Dartmouth who was in office during Dr. Smith's connection with the Dartmouth Medical School. Dr. Nathan Smith's part in founding the medical department of the University of Vermont at Burlington, in 1821, was largely through co-operation with his oldest son Dr. Nathan Ryno Smith; it is probable that the elder Smith's experience in medical education played the more important part. With all these medical school responsibilities and extensive medical practice he was one of the most skillful surgeons of his time. He did one of the first, if not *the* first, ovariotomy done in New England. This was in 1821. His two outstanding contributions to Medical Literature were on Typhus Fever and the Pathology and Treatment of Necrosis, both of which are classic to this day. New England has reason to be proud of the achievements of her pioneer spirits in medicine as well as in other fields of activity.

MISCELLANY

RULES ADOPTED BY THE TRUSTEES OF THE UNION HOSPITAL OF FALL RIVER WITH RESPECT TO INDUSTRIAL ACCIDENT CASES

At a meeting of the Trustees of the Union Hospital, held on April 17th, the following vote was adopted:

"VOTED: That from and after June 1, 1928, all industrial accident cases, and such other accident cases as the Superintendent shall from time to time determine, shall be accepted at the Union Hospital only as private cases, and assigned to semi-private

wards, unless arrangement for admission to private rooms be made by the patient or in his behalf.

Upon admission, or as soon thereafter as possible, the patient, or some authorized person acting in his behalf, shall be informed that payment must be made for medical services in addition to Hospital charges; and that any physician permitted to practise in the Hospital may be selected, but if no selection be made, the physician then on service in the specialty to which the case should be assigned will act as his private physician. Until such choice is made, the Staff physician on service shall be required to attend the patient, so far as his condition requires, without compensation.

In the event that the case shall not be found to be entitled to insurance compensation, the patient's hospital payment may be rebated to ward charges, and the attending physician shall make no claim for fees unless and until it is found that the patient is financially able to pay physician's fees.

If the insurance company, the patient, or any other party responsible for the payment of hospital and medical fees shall notify the Hospital that physician's fees are regarded as excessive, the Hospital reserves the right to require the physician called or designated by it to reduce said fees to such amount as the Hospital authorities deem just and proper."

The Trustees were informed that all other hospitals in the City admitted such cases as private cases, and that many hospitals throughout the State followed the same plan, in accordance with the report of the Legislative Commission to the effect that this lay within the power of hospital trustees.

The vote provides that the patient, or any responsible party, may nominate the physician; and the Hospital will be glad to notify any physician who may be designated by your Company to be called in the event that the patient makes no selection, provided the physician designated is, under the rules of the Hospital, permitted to practise therein. These rules provide that any reputable physician conforming with the standards and rules established by the Hospital shall be permitted to treat patients in the private wards, and we assume that any physician designated by the insurance company will be entitled to such privilege.

We beg to suggest, however, the desirability of nominating men on the Staff of the Hospital. Cases heretofore admitted to the Hospital have been assigned to a surgeon, orthopedist, or some other specialist indicated by the nature of the injury, and not infrequently cases are referred for consultation or treatment to several specialists; and it not infrequently happens that the first physician indicated is not available, in which event members of the Staff are called until one may be found who may promptly attend the case. The difficulty of carrying out this efficient service without a panel of competent men is obvious, and the Hospital authorities, of course, are convinced that the members of its Staff are competent in their various fields.

It is the desire of the Hospital to make this service as efficient and inexpensive as possible, and it is our belief that members of the Staff attending such cases should be able to do so for lower fees than should be charged by others, simply because of the saving of time and expense by reason of attending cases in connection with their visits to the Hospital for other patients.

It is not the intention of the Hospital to call physicians for trivial injuries. It has been the rule of the Hospital that visiting Staff men should be called when there was any difficulty of diagnosis or any suspicion that the patient should be admitted to the Hospital, but the House Physicians are permitted to treat minor injuries, such as could be properly discharged from the accident room without admission to the Hospital. It is the intention of the Hospital to continue this program, and, in such event, no physicians' fees will be charged.

The Hospital desires to co-operate with the insurance companies in every way and to carry on the work in a manner approved by the companies. If therefore, you have any suggestions to make with regard to the method of carrying on this work, the Trustees would be very glad to consider them and amend the regulations accordingly.

OBITUARY

DR. HOWARD A. LOTHROP

Dr. Howard A. Lothrop, who died on June fourth, two weeks after an infection of his right thumb, was born in Sharon, Massachusetts, on December 31, 1864, the son of Horace A. and Sarah Gorham (Swain) Lothrop. As a boy and student he was greatly interested in natural history, especially ornithology. He made a wonderful collection of birds, which he stuffed and set up himself with remarkable skill and success. The deftness of hand, which was in this way developed in youth, contributed not a little to the skill which he afterward displayed as a surgeon. He attended the Boston Latin School, entered Harvard College and graduated "magna cum laude" in the class of 1887. He graduated from the Harvard Medical School (where he led his class) in 1891 with the degree of A.M. and M.D. He studied in Vienna for two years, then served as house officer at the Massachusetts General Hospital. Entering practice in Boston, he soon received an appointment as Surgeon to Out Patients at the Boston City Hospital, where he did excellent work, rising through the grades to Surgeon in Chief. His surgical work was skillful, conservative and successful. At one time he did some brilliant work on the ligation of arteries for aneurysm. He was one of the early contributors to our knowledge of epigastric hernia. He was instructor in surgery in the Harvard Medical School from 1903 to 1912, Assistant Professor of Surgery from 1912 to 1922 and Acting Professor of Surgery 1922-1923. He devoted a great deal of care to the preparation of his lectures and clinics, never missed his appointments with the students, and took special pains to give adequate instruction in surgical technique. He was a member of the American Surgical Association and for many years a contributing member at its meetings.

Dr. Lothrop made an enviable reputation for himself as an expert witness in accident cases. He was fair, conservative and accurate in his statements and his counsel was often sought by accident boards and corporations in the disposition of such cases. He was very fond of music, was a skillful musician, had a fine tenor voice, which he cultivated until he became a welcome singer at evening entertainments. He sang for many years in the Harvard Alumni Chorus. He took great interest in the "Doctors," a social club formed around the members of the class of 1891 in the Medical School, of which he was a member. He never married. He lived with his mother, who survives him, as do his

two brothers, Dr. Oliver A. Lothrop of Boston, and John Howland Lothrop of Portland, Oregon, and three sisters.

He was a hard working, faithful and skillful surgeon, and as a result of his skill gained a large practice and many enthusiastic admirers. He had retired from the staff of the Boston City Hospital in January 1927, but continued to attend to his large private practice. He was one of the youngest looking men among his contemporaries, and although never athletic, kept in fine bodily condition. His death was caused by septicemia which resulted from an infection of his thumb, pricked by a safety pin two weeks before. This infection proved fatal in spite of all efforts, including amputation of the arm. He bore his last illness with amazing fortitude and faced the amputation with unshrinking courage. In his death this community has lost a skillful and conservative surgeon, and in his profession he left a place which will be hard to fill.

CORRESPONDENCE

A CORRECTION OF THE REPORT OF THE CAPE COD HEALTH BUREAU ASSOCIATION

The Commonwealth of Massachusetts
Department of Public Health

State House, Boston, July 2, 1928.

N. E. JOURNAL OF MEDICINE:

In your issue of June 7 you report the meeting of the Cape Cod Health Bureau Association. In summarizing the remarks by Edward Wright, Asst. Engineer of this Department, who appeared for me, in regard to the problem of garbage and refuse disposal, he is quoted as saying that the quantities of putrescent garbage range from about one hundred pounds "per day per capita" to three times this amount. Although the Cape is peopled by a remarkable race their garbage waste, however staggering, does not reach this appalling figure. The figures were for the year rather than for the day.

Thanking you for making this correction, I am

Yours truly,

GEORGE H. BIGELOW, M.D.,
Commissioner of Public Health.

EDITORIAL NOTE:—This report was submitted by a reporter who was supposed to have made a correct quotation.

NOTICE OF MEETING

THE SOUTH END NEIGHBORHOOD MEDICAL CLUB

The next meeting of the South End Neighborhood Medical Club will be held at Prendergast Preventorium, Harvard and Ashland Streets. Mattapan, on Tuesday, July 17, 1928, at 12 noon.

John B. Hawes, 2d, M.D., and Dr. Eli Friedman will conduct an examination of a group of children. All physicians are urged to bring their stethoscopes. Please be sure to come.

SOCIETY MEETINGS

July 17—South End Neighborhood Medical Club. Complete notice appears elsewhere on this page.

October 15-19 — Interstate Post Graduate Association. Complete notice on page 1025, issue of June 28.

December 3-7 — Radiological Society Convention. Detailed notice appears on page 712, issue of May 17.

DISTRICT MEDICAL SOCIETY

Middlesex South District Medical Society

July 18—Middlesex South District Medical Society. Complete notice appears on page 58, issue of July 5.

BOOK REVIEWS

Post-mortem Appearances. JOAN M. ROSS. Oxford University Press; 2nd edition, 1928. Pp. 215.

The second edition of this little handbook does not show many striking changes from the first. The external appearances of the body and the internal gross appearances of the organs are described in all of the common causes of death and many of the violent causes of death. Of necessity in a book of this sort, there is a good deal of generalization, and of course only the most typical appearances are described. Apparently there are some slight differences between the gross manifestations of disease in this country and in England.

The author is apt to be at times a bit too dogmatic as in her opening sentence describing the external appearances of pernicious anemia she states "The body is that of a man over thirty-five years old". Again, under gastric carcinoma, "The body is that of a man between forty and sixty years of age". On the whole, however, the information is accurate and given in compact and readily accessible form. Perhaps though it deserves a place in the general class of quizz compend type of literature rather than in that of textbook type.

Special Cytology. Edited by EDMUND V. COWDRY. 2 volumes, pp. 1348. Paul V. Hoeber, Inc. 1928.

The group of monographs contained in these two volumes emulates the previous group of monographs also edited by Dr. Cowdry on general cytology. By the nature of the two subjects however these last two volumes have difficulty in approaching the standards set by "General Cytology".

The various tissues and organs of the body are considered in detail. Some of the sections present much new or little known material, while still others are disappointingly similar to the treatment accorded in the usual textbook of histology. The illustrations throughout are well-chosen and are technically good. Lists of references giving the more important literature on various subjects are included.

Of particular interest because lightly treated in the usual textbooks are the sections on the cellular elements of the blood particularly those by Maximow; that on the specialized systems of the heart by Todd; that on the pancreas by Opie; and that on the thyroid, parathyroid and thymus by Marine. As in any book made up of a group of monographs by different writers some are of greater interest and value than others.

The JOURNAL does not publish the price of books received for review because of Postal regulations. Requests for this information addressed to the JOURNAL office will receive early attention.